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...page 30

► **Milwaukee Push-Pull Coaches**

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RAILWAY

LOCOMOTIVES AND CARS

JULY 1961



Actions of Annual AAR Mechanical Division Meeting ... page 23

Oakite adds more **POWER** to your **MANPOWER**



...simple setup cleans diesel wheels automatically

This Oakite automatic wheel-cleaning system makes things a lot easier for your clean-up crew—relieves them of tedious, time-consuming work. Charged with a solution of Oakite 120, it automatically removes oily, sticky soil and road dirt . . . leaves wheels completely clean for quick inspection. This modern Oakite mechanized method is bound to show a net savings for your road.

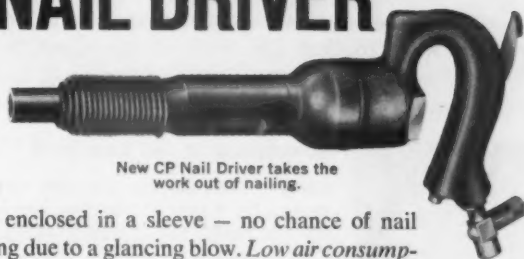
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methods like these give you the *important* advantage: **LOW-COST END RESULTS**. Ask the Oakite man for engineering drawings and details. Or write Oakite Products, Inc., 46 Rector Street, New York 6, N. Y.

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over **50** Est. 1909 
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you need the **NEW CP NAIL DRIVER** for 4 to 60 penny nails



New CP Nail Driver takes the work out of nailing.

Railway car rebuilders find the new CP Nail Driver compact, light and a great time-saver. It gets right into cramped spaces where you can't swing a conventional hammer.

It's fast . . . drives a 60 penny nail in 20 seconds. *It's easy . . .* operator just locates nail on work and squeezes the throttle lever. Teasing action lets you start nails easily, then increase hammering action as needed. *It's safe . . .* nails

are enclosed in a sleeve — no chance of nail flying due to a glancing blow. *Low air consumption . . .* a small 1 hp compressor is ample for most jobs. *It's durable . . .* only two simple long-wearing parts held on the hammer by a rugged beehive retainer. Five standard models available with pistol grip and air regulator. Write for full details. *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N.Y.*



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quality-engineered for lasting dependability

AAR CONDITIONALLY APPROVED

WIKIT Journal Lubricators are designed and manufactured by Callaway Products, Inc., with a single objective —to provide effective lubrication continuously under all operating and weather conditions. To this end, all materials

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WIKIT #11 retains 7 pints of oil after saturation and draining 3 hours. Cores are best quality neoprene foam—resistant to oil, moisture, heat, compression set. Strong nylon tape secures non-ferrous pull handle. Insert either end first, either side up!

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Modern plant where WIKITS are made



LOCO- MOTIVES AND CARS

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REPORT FOR JULY

Radioactive Tests Solve Diesel Problems

Value of radioactive tracer techniques in analyzing locomotive diesel engine wear was emphasized at the annual meeting of the Society of Automotive Engineers held in St. Louis, Mo., June 5-9. Reports of two separate radioactive piston-ring test programs indicated how effective the method can be in determining the results of using different locomotive fuels, or of installing components not previously tested.

The Southern Pacific, in cooperation with Standard Oil Co. of California and California Research Corporation, has for several years been studying the problems involved in burning residual fuels in locomotives with dual-fuel systems (RL&C, Nov. 1956, p 55).

The test program was conducted in three separate phases. The first phase consisted of short-term radioactive ring wear tests in a standing 16-cylinder EMD 567C engine to evaluate distillate and residual fuels, lubricating oils, operating conditions, engine air filters, and power assembly metallurgy (RL&C, March 1959, p 15; Aug. 1959, p 33).

Phase two involved service tests in 27 EMD 5 567B freight locomotives. The lubricating oil from these "companion" units was periodically transferred to a captive EMD 567C test engine equipped with radioactive rings for wear measurement. In this part of the test the effects of lubricating oil type and lubricating oil filter design were studied both in residual and distillate fuel locomotives.

In the third phase of the program, the important findings of the radioactive ring wear studies were applied to, and evaluated in, Southern Pacific's Roseville, Calif., fleet of residual fuel-burning engines.

Final result of the work has been to save an estimated \$400,000 annually on the operation of 167 residual-fuel units. "The

operating and mechanical changes made in the residual fuel locomotives were based on more than 200 test runs in the radioactive ring engines," it was reported. "It would have been virtually impossible to obtain by conventional test methods the amount of data required to make the same recommendations on an equally sound technical basis."

The Denver & Rio Grande Western, working with Electro-Motive and Standard Oil Co. of California, sought to determine the effect of several engine design variables upon piston ring wear in a GM Model 16-567C diesel engine. The radioactive tracer technique was employed because of the rapidity with which the effect of each variable could be assessed.

Tests evaluated compression ring wear with the following engine design variables: unit fuel injectors; compression rings; oil control rings.

Tests were conducted with a high quality distillate fuel, and with a mid-continent crude oil.

"On the basis of results obtained from radioactive ring wear tests, it is apparent that the design of the fuel injector, compression ring, and oil control ring, respectively, can influence the wear rate of compression rings," researchers reported. "The effect upon compression ring wear of each of these three design variables is very definitely influenced by the quality of fuel supplied to the engine. In addition, the operating conditions of the diesel engine—that is, speed and brake horsepower—affect the extent to which each variable, including fuel quality, influences compression ring wear."

"Great potential value can be realized from radioactive wear tests of chromium-plated rings because of the possibility of examining the many parameters which simultaneously affect the wear rate of ring face and side."

(Turn to page 10)

TIME SAVING IDEAS FOR JULY

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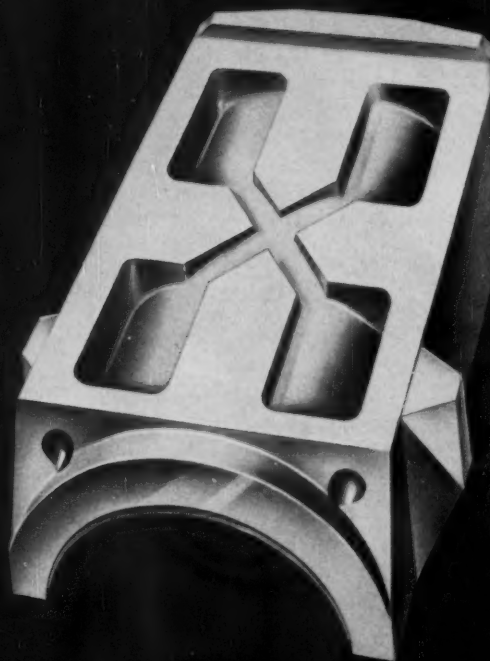
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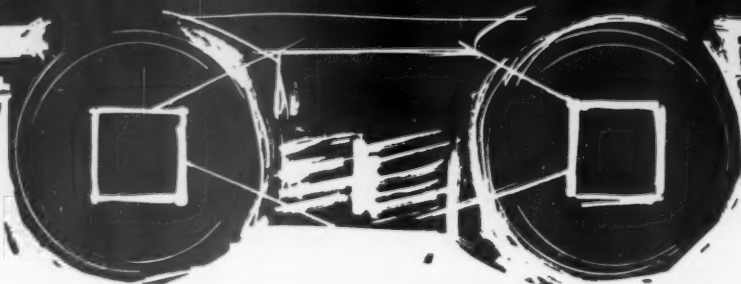


POSITIVE CONTROL

KEY TO BETTER JOURNAL BEARING PERFORMANCE



Positive control flatback bearing[†] achieves stabilized journal assembly without any alteration or modification of box. It has established an impressive record for longer life and fewer hot boxes.



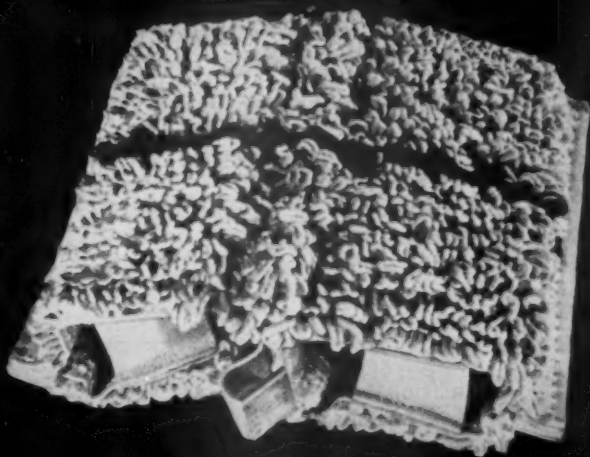
FAAR approved for limited application for test in interchange service.

■ Dollar for dollar, this Absco positive control "package" appears to be the most efficient bearing assembly available. Applied to the average interchange car of today and tomorrow, it gives highest promise of upgrading bearing performance for the total fleet. ■ The key to this concept is positive control of journal and bearing motion, positive con-

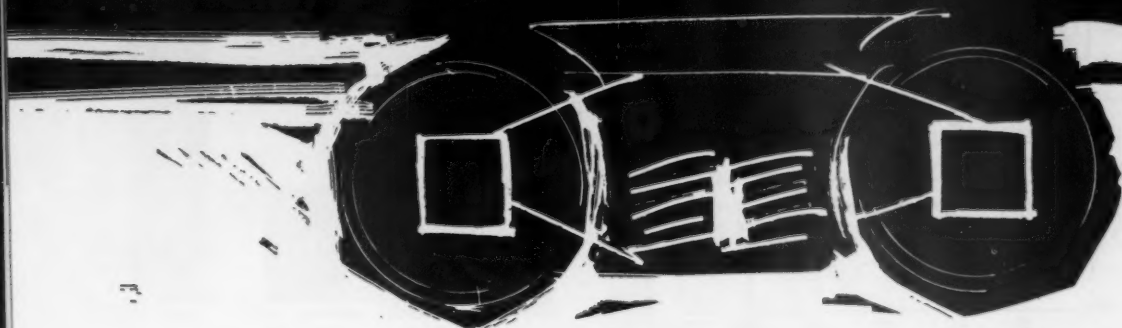
trol of oil in the box, and positive control of oil flow to the journal. ■ To stabilize the axle, without the expense of journal stops and box modification, use Absco positive control flatback bearings. To keep oil in the box and foreign material out, install simple, inexpensive Absco dust guards. To feed sufficient quantities of oil to the journal, rely on Absco



Positive control of oil in box is an important advantage of the Absco dust guard. Simple, durable, economical, it effectively keeps oil in, keeps dirt and water out.



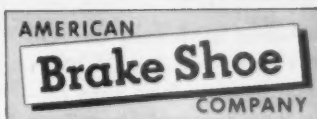
Positive control of oil flow is assured by the Absco lubricating pad*. It is simple to install, easy to renovate, and efficient under all conditions.



*AAR conditionally approved.

lubricating pads. ■ Singly and in combination, these bearing products are helping progressive railroads cut costs and improve services. Your American Brake Shoe representative will be glad to give you full details. American Brake Shoe Company, Railroad Products Division, 530 Fifth Avenue, New York 36, New York.

A-1000

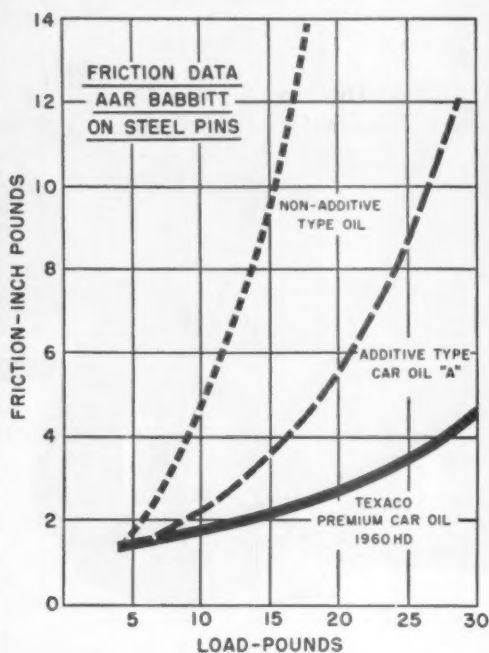


**Quality products
cut your
ton-mile costs.**

Three reasons why new can help reduce hot

60% less friction

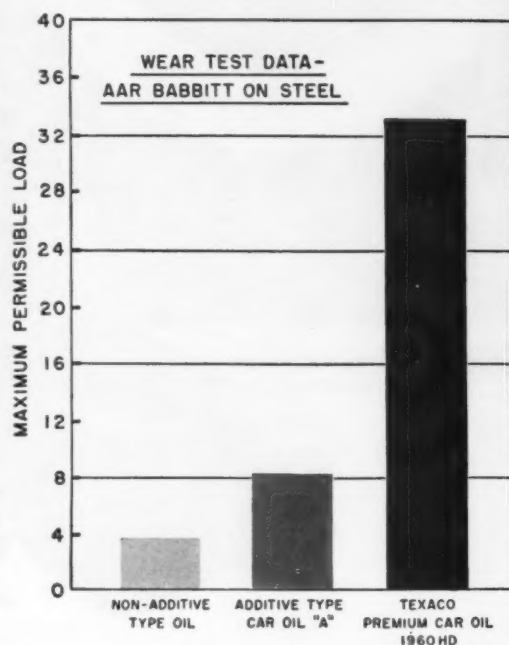
Less friction means lower operating temperatures . . . an important reason why Texaco Car Oil 1960 HD can help cut hot boxes as much as 40%. A special additive gives Car Oil 1960 HD a 60% lower friction coefficient under heavy load than most non-additive type oils.



Lower friction coefficient of Texaco Car Oil 1960 HD graphically illustrated. Car Oil 1960's ability to resist friction becomes even more pronounced as load-pounds are increased. The uniform quality of Texaco Car Oil 1960 HD assures consistently reliable performance.

8 times greater load-carrying capacity

Metal-to-metal contact between journal and bearing, the result of localized high bearing pressure, is a common beginning of hot boxes. Actual tests at Texaco's Research Center prove that Car Oil 1960 HD retains its protective oil film at a pressure 8 times greater than the failure point of a non-additive type oil.



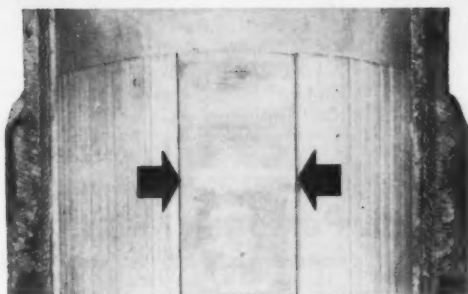
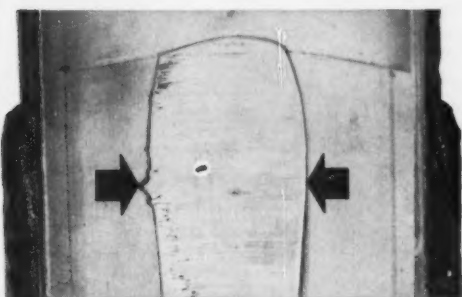
Greater load-carrying capacity of Texaco Car Oil 1960 HD graphically illustrated. Car Oil 1960 HD retains its protective oil film at a laboratory pressure much greater than would be encountered under average operating conditions.

Car Oil 1960 HD can actually prove more economical

Texaco Car Oil 1960 HD boxes as much as 40%

Minimum bearing metal displacement

Scored, worn, and misaligned bearings are also a common cause of hot boxes. Texaco Car Oil 1960 HD has a built-in characteristic that hinders gross bearing metal removal. Instead, Car Oil 1960 HD redistributes minute amounts of babbitt...*actually assists in reseating the bearing.*



Smoother bearings with Texaco Car Oil 1960 HD. Contact areas of above journal bearings were reduced to 9 sq. inches and subjected to identical tests. Serrated edges (arrows) on top bearing, run on non-additive type oil, indicate considerable metal displacement. Straight edges (arrows) on lower bearing, run on Texaco Car Oil 1960 HD, indicate almost no metal displacement.

Savings can reduce car oil costs by 22¢ a gallon

Five major roads reported up to 40% decreases in hot boxes after switching to Texaco Car Oil 1960 HD. Savings because of reduced hot boxes can more than offset the slight additional cost of premium Texaco Car Oil 1960 HD.

For example: Suppose a road using 200,000 gallons of car oil yearly reduces hot boxes from 1,100 to 660 by switching to Car Oil 1960 HD in all journal boxes—using both summer and winter grades. A minimum saving of \$100 on each eliminated hot box would net this road \$44,000. This sum, if applied to the purchase price of the car oil, would reduce its cost by 22¢ a gallon. Therefore, in real terms, the per-gallon-price of Texaco Car Oil 1960 HD is actually about 16¢ less than the price previously paid for the non-additive type oil.

For full details on how Texaco Car Oil 1960 HD and unmatched service can mean fewer hot boxes for your road, call the nearest Texaco Railway Sales Office in New York, Chicago, San Francisco, St. Paul, St. Louis or Atlanta. Or write:

Texaco Inc., *Railway Sales Division*, 135 East 42nd Street, New York 17, N. Y.

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Report

(Continued from page 5)

Automated Trains Called Natural Progression

Progress in electronic circuitry, communication media, and servomechanisms have produced the evolution from the continuous automatic train control system of the 1920's to today's fully automatic trains. L. R. Allison, section engineer of Union Switch & Signal, told last month's AIEE Automation Conference in Cleveland, Ohio, that this has been a "natural and logical progression."

Mr. Allison said the step-by-step evolution has been:

- Cab signaling with or without speed limiting;
- Elimination of wayside signals;
- Automatic control of speed;
- Automatic control of slowing or stopping;
- Elimination of the engine crew.

Mr. Allison discussed some of the current automation projects including portable and remote locomotive controllers, the "slave" or unmanned helper locomotive, the automated subway train of the New York Transit Authority, and the automation of long freight trains (RL&C, Nov. 1960, p 21).

Equity Could Trigger Technical Breakthrough

Railroads can achieve massive technical breakthroughs in the next decade "provided prompt action is taken to bring equity among all the nation's carriers," New York Central President A. E. Perlman told the National Press Club recently.

Carrying the industry's plea for equal treatment to an audience often considered to be the most influential in America, Mr. Perlman predicted that, by 1970, the railroads would be offering the following facilities if given the chance:

- New lightweight metal freight containers—interchangeable with every mode of transport—that would replace today's conventional freight cars.



In the construction of this 30,300-gal tank car, General American engineers have eliminated the conventional underframe, utilizing the tank as the longitudinal structural member which takes the stresses of buff and draft. The car is 66 ft long—19 ft shorter than other large-sized tank cars. Tank diameter increases from 99 in. at each end to 118 in. at the midriff. Because of the bulge in the tank, which prevents installation of brake rods from such a central point, each truck is equipped with a separate air-brake system. According to Spencer D. Moseley, General American's president, the capacity of tank cars built in the future can be varied by varying the length of center section. The car is the largest which can be built on four-wheel trucks; larger cars can be built with six-wheel trucks. The car has been leased to Phillips Petroleum Company which has ordered 50 for moving liquefied petroleum gas and anhydrous ammonia between manufacturing plants and its large storage points.

Orders and Inquiries for New Equipment

Placed Since the Closing of the June Issue

Diesel-Electric Locomotive Orders

NORFOLK & WESTERN, *Electro-Motive*, 24 GP-18, 1,800-hp all-purpose road switchers. Also, 6 RS-11, 1,800-hp road switchers. Deliveries expected to be completed by August. Cost of 30 units, over \$5,750,000.

READING, *Electro-Motive*, 10 900-hp switchers. Four to be equipped with multiple-unit controls. For July, August, and September delivery.

Freight-Car Orders

AMERICAN CAR & FOUNDRY, *Company shops*, 340 95-ton ore cars for a mining company in Northern Minnesota.

ERIE-LACKAWANNA, *General American*, 100 85-ft piggyback flat cars. Cost, approximately \$1.5. Delivery scheduled for around September 1.

FRUIT GROWERS EXPRESS, *Company shops*, 90 50-ton, 40-ft bunkerless refrigerator cars; 120 70-ton, 50-ft bunkerless refrigerator cars. For delivery beginning in September.

GENERAL AMERICAN, *Company shops*, 29 30,300-gal tank cars—10 for Wanda Petroleum; 10 for Union Petroleum; 5 for Cities Service; 4 for Signal Oil.

GRAND TRUNK WESTERN, *American Car & Foundry*, 200 50½-ft double-door box cars. For September delivery.

KANSAS CITY SOUTHERN, *Pullman-Standard*, 150 all-steel, 50½-ft, 70-ton box cars, with 9-ft doors and roller bearings. 100 to have cushion-type underframes and 50 to have Evans DF loading devices). *American Car & Foundry*, 50 all-steel 50½-ft, 70-ton box cars with 9-ft doors, Evans DF loading devices, and roller bearings.

LOUISVILLE & NASHVILLE, *Pullman-Standard*, 550 70-ton hoppers; 40 90-ton aluminum-body covered hoppers. All cars to be roller-bearing equipped. For early delivery.

MAINE CENTRAL, *Thrall Car Manufacturing*, 50 50-ft, 50-ton pulpwood cars. For delivery at rate of 15 weekly beginning in mid summer. Estimated cost over \$500,000.

NEW YORK CENTRAL, *Despatch shops*, 500 box cars (RL&C, June, p 6). Cost, \$5,316,000. Delivery to begin this month.

NORFOLK & WESTERN, *Pullman-Standard*, 50 70-ton, 3,215-cu-ft-capacity covered hopper cars. Cost, over \$500,000.

NORTH AMERICAN CAR, *Pullman-Standard*, 129 Lo-Dek flat cars equipped with tri-level Whitehead & Kales auto racks. For NITX car pool. 79 89-ft cars to be assigned to Milwaukee Road and 59 87-ft cars to the New York Central. June-July deliveries.

PHILLIPS PETROLEUM CO., *General American*, 50 30,300-gal tank cars. General American building additional cars for lease to other shippers.

SHPX 1, SHIPPERS CAR LINE SUBSIDIARY, *American Car & Foundry*, 80 190-ton aluminum

Center Flow covered hoppers. To be leased by Kaiser Aluminum & Chemical Corp., with deliveries beginning in September. Order upgraded from original total of 60 (RL&C, June, p 33).

SANTA FE, *General American*, 100 85-ft roller-bearing-equipped flat cars, 25 to be equipped with multi-level auto racks. For July-August delivery.

TRAILER TRAIN, *American Car & Foundry*, 75 flat cars, *Bethlehem Steel*, 75 flat cars, *Pullman-Standard*, 185 flat cars, including 115 of a special low-profile design to provide maximum clearance. All cars equipped with roller bearings and, according to Trailer Train, can be fitted with auto racks by individual roads. Deliveries completed in June. Additional 165 cars to be ordered in near future.

UNION PACIFIC, *Company shops*, 500 40-ft, 50-ton box cars with plug doors; 200 50-ft box cars with plug doors; 200 50-ft box cars with standard double doors; 200 50-ft, 70-ton insulated box cars equipped with self-contained load-securing devices. Deliveries scheduled for remainder of this year and early 1962.

UNION TANK CAR, *Company shops*, 125 tank cars ranging from 10,000 to 30,000 gal capacity.

Passenger-Car Orders

NEW YORK CENTRAL, *Pullman-Standard*, 53 commuter cars. 26 to be purchased outright at a cost of \$4,005,396. Port Authority of New York (under a commuter-aid plan that calls for further orders in the near future) will purchase remaining 27 cars at a cost of \$4,159,616, and will lease them to NYC for an initial period of 25 years.

Notes and Inquiries

Metropolitan Transit Authority of Boston has requested bids for 92 high-speed rapid-transit cars to replace all 135 cars now in service on Cambridge-Dorchester line (RL&C, June, p 6). Deliveries, to begin in July 1962, to be completed by March 1963.

New York City Transit Authority inquiring for 200 new subway cars for IRT line. Reportedly, bids will be sought on an additional 300 cars next fall.

Philadelphia Passenger Service Improvement Corp., who have been asked to bid on the supply of 26 commuter cars for PSIC (RL&C, June, p 6), requested to furnish cars for up to 30 more cars, provided additional funds are available in 1961-62. Specifications call for placing the new air-conditioned, stainless-steel cars in service within 15 months after award of contract. Cars to be purchased with public funds as part of city-sponsored rail modernization plan. City to lease equipment to the Pennsylvania and Reading.

(Reading rebuilding six Alco locomotives in company shops. Work includes installation of new Alco engines.)

- Completely automatic trains running under electronic controls. Express trains, said Mr. Pearlman, could deliver goods to major cities on one-day schedules, and coast-to-coast service would take as little as three days.

- Fast, streamline commuter trains, providing low-cost service to metropolitan stations where passengers would be fanned out by bus and subway.

- Integrated transportation so that a businessman could buy, from a railroad, freight service by rail, air, highway or water—or a combination of any of these four, depending on the speed and cost desired.

Personal Mention

Canadian National.—Montreal: N. A. KLODNISKI appointed electrical and mechanical engineer. Moncton, N.B.: WILLIAM CAMERON appointed mechanical and electrical engineer, Atlantic Region.

Canadian Pacific.—Winnipeg, Man.: T. F. DONALD, superintendent of motive power and rolling stock, Prairie region, retired.

Florida East Coast.—St. Augustine, Fla.: H. P. HAHN, JR., appointed general car supervisor.

(Turn to page 54)

Lets one
man do
the work
of three!



The built-in hypocycloid gear is the power secret! Free to follow the eccentric crankshaft, but not free to rotate itself, it produces a 6:1 reduction ratio.

*Patent Pending

NEW! Wine Power Geared^{*} Discharge Gate

EVEN UNDER A 70-TON LOAD one man can open this new gate. Accurately machined mating surfaces provide bind-free operation and a tighter seal. No more sledging or car damage in attempts to open "frozen" hopper doors. Electric steel castings eliminate distortion.

PRECISION-MESHED GEARS without costly machining! Amazingly accurate shell molding process helps keep unit competitively priced despite *Power-Gear* feature. Rack-and-pinion principle assures parallel operation without side binding. All bearing surfaces are permanently lubricated.

COMPLETELY PREASSEMBLED for easy installation, ready for welding. No further fitting, no extra parts required during assembly of car. 13x24" opening fits most standard chutes. Interchangeable with most present gates; equipped with standard boot groove. Conforms to all recognized unloading devices. Now in service on six major railroads.

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WILL CONVINCE YOU!
Complete specifications and
application data on request.

WINE
Railway Appliances

WINE Railway Appliances by UNITCAST CORPORATION • TOLEDO 9, OHIO

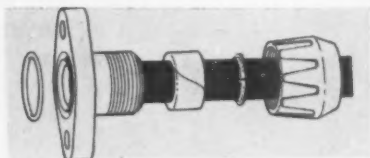
WHAT'S NEW IN EQUIPMENT



Container Cradles For Flat Cars

The Duo-Cradle, permanently fitted to the decks of 85-ft piggyback cars, makes them suitable for container service. The cradle frame carries removable cross-bolsters and consists of a pair of side channels spaced by cross-members. It is cushioned by a pair of deck-mounted shock absorbers. The channels straddle the trailer hitches on the cars and can, themselves, be straddled by the dual wheels of tractors and trailers after the cross-bolsters are removed from the frame. Clips attached to the car deck serve as guides and retainers for the cradles.

When a container is carried, it rides on a pair of the removable cross-bolsters mounted on the frame. Separate cross-bolster positions permit handling containers of different lengths. For trailer service, the cross-bolsters are removed and stored lengthwise in racks carried by the frame between the channels so as not to interfere with the movement of trailers on the cars and to be instantly available for the hauling of containers. *Youngstown Steel Door Co., Dept. RLC, 590 The Arcade, Cleveland 14, Ohio.*



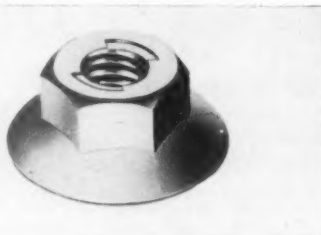
Pipe Fitting

A positive seal, regardless of temperature variations from -50 to 200 deg F, is said to be obtained from the Gripseal air brake pipe fittings. The compression ring which grips the pipe is of special hi-lo temperature rubber compound. Its Teflon coating eliminates twisting or galling of the compression ring when the nut is tightened and insures non-adherence of the ring to the inside surface of the nut when subjected to charring temperatures. A stainless-steel retaining ring prevents extrusion of the compression ring which can be renewed without dismantling the pipe. The land and groove design on the surface of the compression nut gives extra wrench clearance and permits use of open end or pipe wrench when servicing. Fittings are available in all standard sizes for freight and passenger cars and locomotives. *New York Air Brake Co., Dept. RLC, 230 Park ave., New York 17.*

Magnetic Particle Testing

Concentrates forming a new group of materials for the wet method of visible and fluorescent magnetic particle testing are in

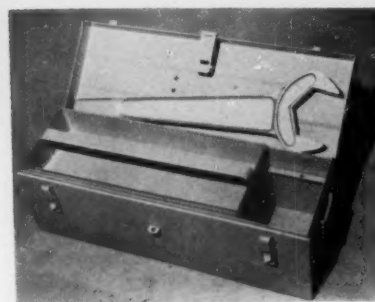
powder form. Their mixing, handling, and storage features are said to be superior to those of previous Magnaflux and Magnaglo pastes. Fluorescent brilliance is increased from 70 to 600%; particle size range is closely controlled, and there is less foaming and more corrosion protection. Four materials are for the visible red or black Magnaflux method, and four for the fluorescent Magnaglo method. Certain concentrates are formulated specifically for oil suspensions; others, for water. The concentrates can be added directly to the oil after measuring the proper amount in a graduated cup, a uniform suspension being obtained almost immediately. *Magnaflux Corp., a subsidiary of General Mills, Dept. RLC, 7300 W. Lawrence ave., Chicago 31.*



Flange Nut

The M-F flange nut combines both nut and washer in one cold-forged piece. The flanged face, it is said, eliminates the need for extra washers and can be used to gap over-

size holes; to provide extra bearing surface; maintain pressure in vibration absorbers, etc. The Unit-Torque locking feature, in a wide range of sizes, can also be supplied with the nut. *MacLean-Fogg Lock Nut Co., Dept. RLC, 5535 N. Wolcott ave., Chicago.*



Portable Tool Box

A tool box, large enough to hold outsized 26-in. wrench, has a carrying handle on top, as well as chest handles at each end. The box is 26½ x 8¾ x 9 in. high and weighs 20½ lb. Tote tray, with socket compartment, also fits other chests in the MBC line. *Metal Box & Cabinet Corp., Dept. RLC, 4720 West Lake st., Chicago 44.*

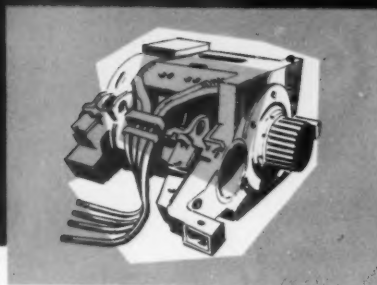


Cleaning Tank

The Porto Lif "tramway" for multi-tank cleaning is a 75-lb capacity, lever-controlled unit that provides 100 to 140 up-and-down motions per minute in cleaning solution. Work is loaded on the platform of the tank at floor level. It is then pneumatically raised and manually rolled on track into position over the first tank. A flick of a lever lowers the platform into the cleaning solution and automatically starts the agitation. At end of cleaning period, the platform is raised and the unit rolled into position over the next tank for an agitated rinse. The unit can be adopted for pre-wash, wash, rinse, anti-rust, or dry operations. It is also available for mounting on 30- and 55-gal drums. *Equipment Div., Magnus Chemical Co., Dept. M-124-3, Garwood, N.J.*

(Turn to page 57)

**N. Y. CENTRAL'S "SUPER-VANS" KEEP
PRECISE SCHEDULES WITH AN
ASSIST FROM NATIONAL BRUSHES**



Because of fast freights or "Super-Vans" as they are known on the New York Central, today's major tonnage is returning to the progressive railroads of the nation.

To maintain precise schedules, every component in the consist—no matter how large or small—must offer exacting performance and rugged reliability.

"National" traction-motor brushes—wherever they are used—provide dependable life and commutation and thereby contribute to added miles with a reduction

in commutator maintenance costs.

To National Carbon Company, improved railroading means a positive program to help the roads solve problems imposed by constantly changing and more difficult electrical conditions. To realize this assistance, just call your "National" Brush Man or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y. In Canada: Union Carbide Canada Limited, Toronto.



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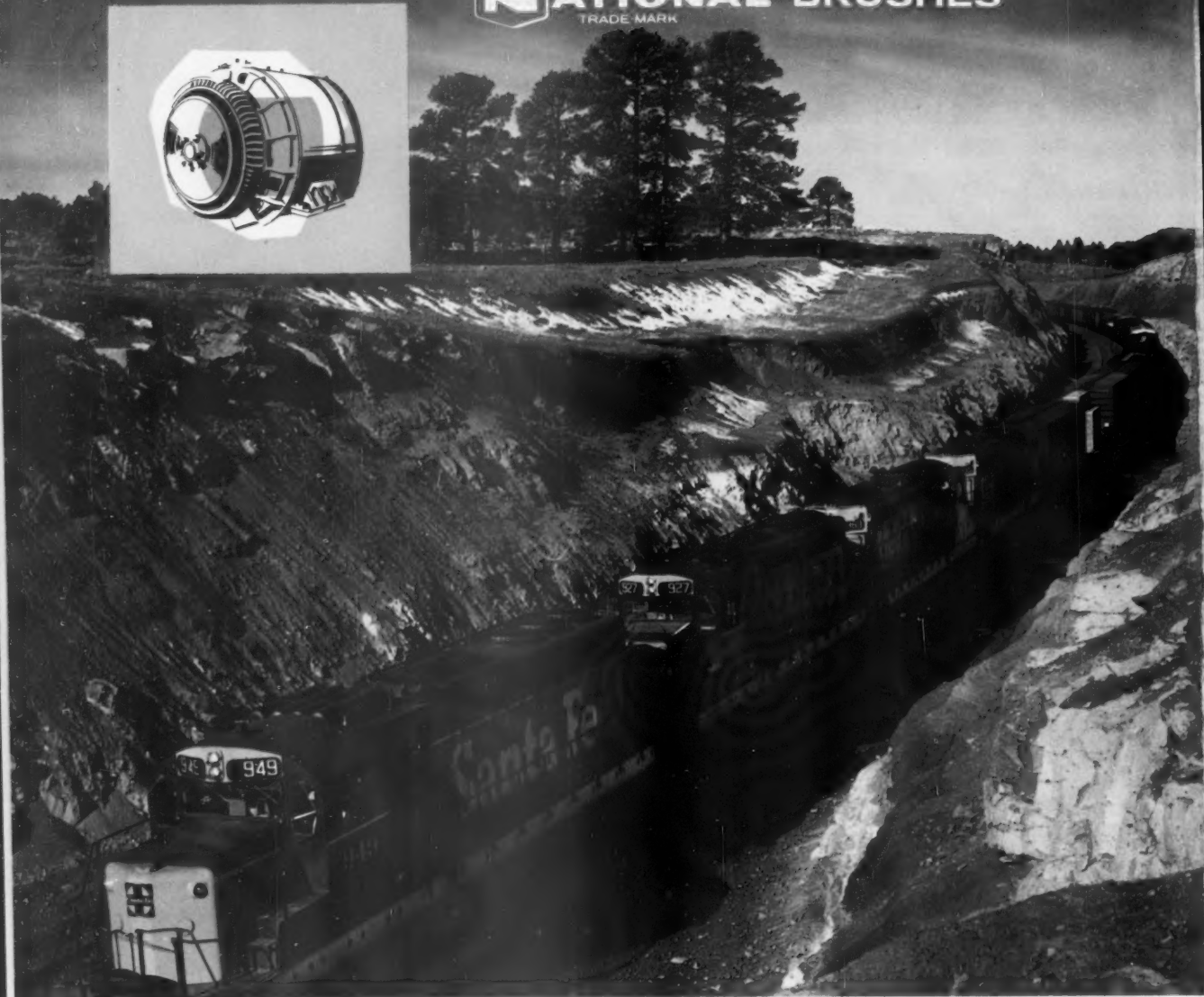
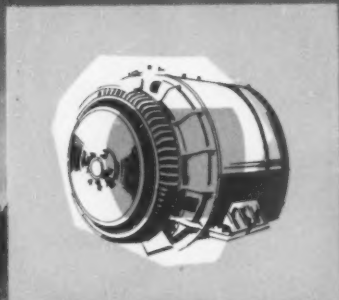
NATIONAL CARBON COMPANY



Contact your
"National" Brush Man

THE SANTA FE'S FAST FREIGHTS KEEP EXACTING SCHEDULES WITH AN ASSIST FROM

NATIONAL BRUSHES
TRADE MARK



Progressive railroads like the Santa Fe are using fast freights for improved, accelerated service for their customers. This modern service requires trouble-free motive power with minimum lost-time for maintenance.

Every component in the complex locomotive—no matter how small or large—must perform dependably under conditions of heavy loading and high speed to meet the exacting requirements of the Santa Fe.

"National" generator brushes—small

but vital components—offer proved commutation and life qualities and operate with the reliability so necessary for today's progressive railroad service.

One of our contributions to improved railroading is a positive service program on carbon brushes. Just call your "National" Brush Man or write National Carbon Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, N.Y. In Canada: Union Carbide Canada Limited, Toronto.



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Contact your
"National" Brush Man

EDITORIALS

Why the Difference?

The AAR directive to "curtail meetings" unless there is a good reason for doing otherwise has been interpreted differently by different divisions of that organization.

The Mechanical Division held a "limited annual business session" on June 28 and 29. It did so as its interpretation of the AAR directive to economize. The session was closed; only the General Committee, chief mechanical officers or their personal representatives, and committee chairmen, were invited. As a result not more than 50 men attended the meeting.

In the latest issue of the "AREA News" the Engineering Division discusses future meeting plans. In alternate years it will hold 1½- and 2½-day meetings. The 1962 meeting will be a 1½-day meeting, a meeting that can be compared with the Mechanical Division's meeting this year. However, the AREA indicates that it will invite officers and all committee members, a total of 250 men, and will welcome everyone that wishes to attend, railroad and railway supply men alike. In other words, this division will hold an open meeting.

Why are there two different interpretations of the same directive? We do not know the answer, but we believe the AREA's interpretation more logical. The work of the AAR divisions is too important to everyone in the industry to be exclusive.

Now Is the Time

Plans to attend and participate in the September meetings at Chicago of the Coordinated Associations and see the exhibits of the Allied Railway Supply Association should be made now.

Excellent and worthwhile programs, as reported in our June issue, have been set up by the Air Brake, Car Department Officers, Locomotive Maintenance Officers, and Railway Fuel and Operating Officers Associations. Meetings of these four associations will start Monday, September 13. No meetings will be held Tuesday afternoon to give all an opportunity to inspect the exhibits.

As this issue goes to press, the Allied Railway Supply Association reports that all the upper floor exhibit space at the Hotel Sherman has been sold and the only remaining available space is in the lower exhibit hall. About 4,500 ft of the 6,500-ft track space at the Illinois Central's 31st Street Yard has been sold to date, already three times the track exhibit space of the 1959 meetings when only 1,500 ft of track was used to display cars and locomotives and their components.

Both the programs and the exhibits point to a September show at which all railroads should be represented. The meetings of the associations will give all mechanical department men the opportunity to find out how savings

in maintenance can be achieved. The exhibits will present the latest developments in equipment, tools, and products that produce savings and improve service.

We urge all railroads to take advantage of these meetings and exhibits because the September conventions have earned an enviable reputation of being outstanding in their value to the industry. Those in September, 1961 promise to be among the best; they merit and deserve fine attendance. If plans have not already been made, now is the time for each chief mechanical officer to make sure that his department has adequate representation.

Better Run Scared

Railroad automation was the subject of a two-day session of the Land Transportation Committee of the American Institute of Electrical Engineers held in Cleveland, Ohio, June 6 and 7, 1961. Papers presented dealt with automated trains, computers, mail handling, unmanned locomotives, and train dispatching. Mechanization has for years been taking over in railroad service, and now it is apparent that some mechanical functions will be completely automated.

A recent example of particular interest is an installation on the Quebec, North Shore & Labrador Railway. Raw gravel is dug from a bank by a shovel and loaded into cars. The operation which follows is controlled by one man and consists of spotting the cars for the shovel, delivering the gravel, a mile away, through crushers and screens as high-quality railway ballast to outgoing cars. The gravel is moved in cars hauled by a remotely controlled diesel locomotive. The plant produces 225,000 cu yd of ballast during a 165-day working season. Extension of the operation, including a seven-mile haul, is planned.

Most forms of mechanization are welcomed by those who are affected by them. It makes the job easier; it permits doing more work, and at least sustains the ability of an employer to continue employment. The character of the work may make changes which necessitate new training and new skills. This can cause awkward displacements, but it has been shown many times that new methods and processes, with more mechanization, makes more work rather than less.

Now the system which has raised American living standards so high is in jeopardy. Foreign competitors also have good mechanization and, among workers whose wage scale is half of ours, there is practically no unemployment. New forms of automation and mechanization must be developed constantly if current or better standards of living and railroading are to be maintained or developed. No one knows enough about our international situation to say just when or how much new competition we can expect, but there is enough in evidence to indicate that it is an excellent idea to run scared.

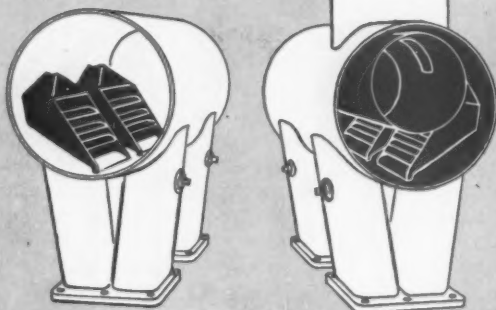
EASIER INSTALLATION... LESS DOWNTIME!

AIR-MAZE

spark arrester conversion kits!

FOR DIESEL LOCOMOTIVES

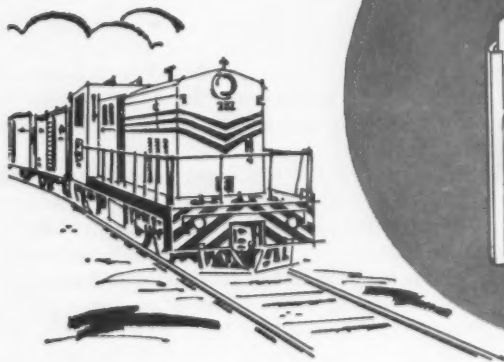
Air-Maze Kit
for EMD manifold



Air-Maze Spark Arrester Kits eliminate the need for obtaining a new manifold to get effective spark control. Deflecting vanes can be simply installed in original manifold during routine engine shopping. Simplified design minimizes number of man hours required for conversion . . . alignment problems sometimes encountered with fitting and welding are minimized.

The Air-Maze Spark Arrester is designed for use with the exhaust manifolds of both EMD and FM switcher and road units. It operates on the principle of centrifuging incandescent particles to reduce their size and temperature before they are exhausted. The addition of the Air-Maze Spark Arrester Kit does not affect engine performance.

Air-Maze Kit for FM manifold



Engine Air Filters • Car Body Filters
Lube Oil Filters • Passenger Car Filters



AIR-MAZE DIVISION
CLEVELAND 28, OHIO

ROCKWELL-STANDARD CORPORATION





The uniform, dense macro-structure of Edgewater wheels is shown in this un-retouched photograph—one-half size.

you can **see**
the uniform **quality**
of Edgewater rolled-steel
wheels

Cut a random section from any Edgewater Rolled Steel Wheel and you'll find grain structure that is dense and homogeneous.

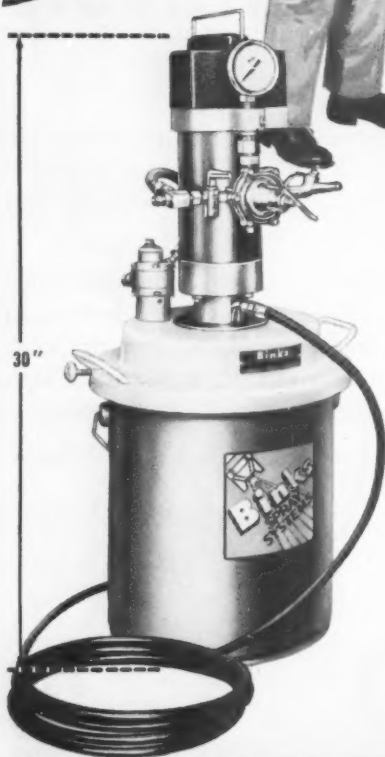
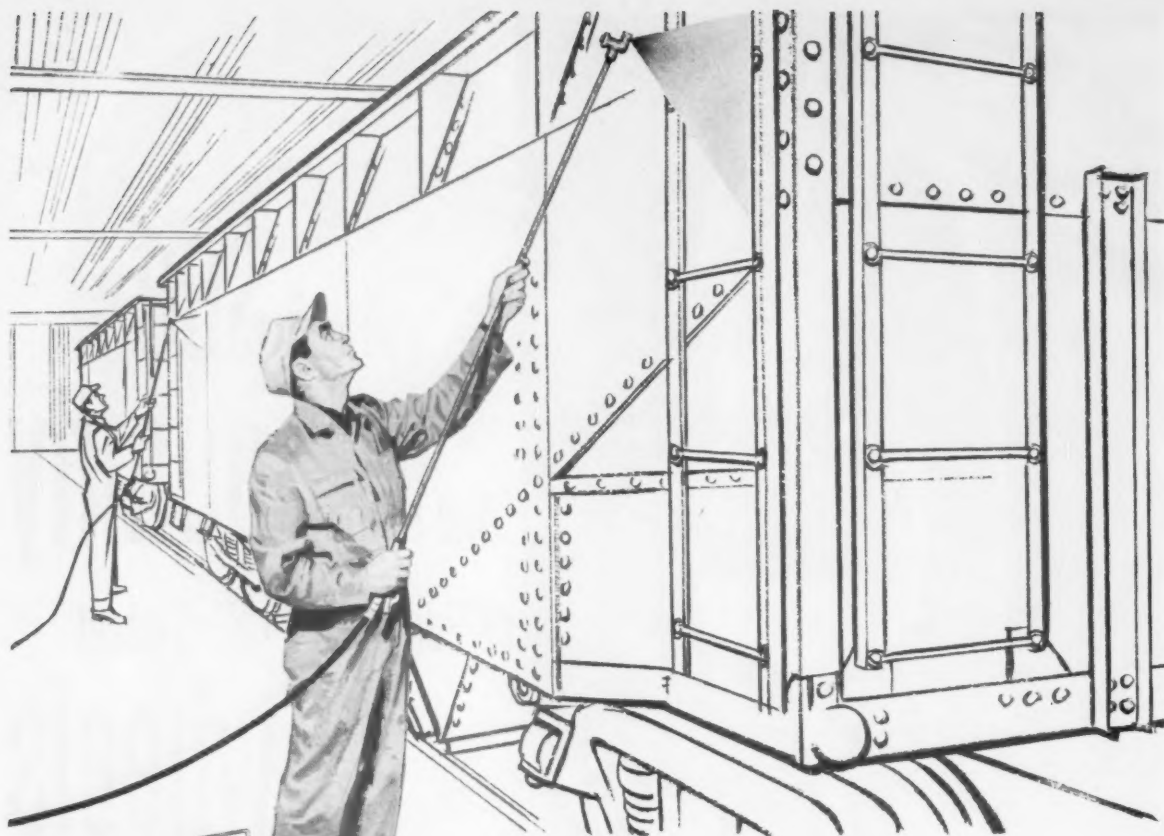
Sound, uniform, forged and rolled steel gives Edgewater Wheels the high strength and toughness needed to resist rail joint impact and the stresses imposed by high speeds, heavy loads and severe braking.

Specify Edgewater Rolled Steel Wheels.



EDGEWATER STEEL COMPANY

P. O. Box 478 • Pittsburgh 30, Pa.



New COMPACT airless spraying outfit

... faster RR car "face lifting"—with less paint!

The new Binks compact airless spraying outfit puts paint on the surface of the railway cars ... not into the air.

Indoors or outdoors the new airless lets you take advantage of high production spray equipment in places and applications where material is usually brushed on.

Only 30 inches high, the new Binks compact airless outfit is light enough to carry around (only 35 lbs.) for a variety of maintenance jobs. All metal surfaces, exposed to spraying materials, are made of tough, non-corrosive stainless steel.

For all the facts, write or call today. Ask for Bulletin A98-11.

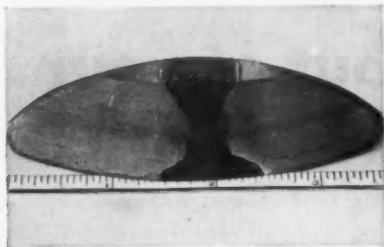
Ask about our spray painting school. Open to all... NO TUITION... covers all phases.

Binks Manufacturing Company 3140-B Carroll Avenue, Chicago 12, Ill.
REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

Binks ▶ Everything for spray painting



Quality control at work on a Bethlehem 85-ft flat car



This 4-inch weld specimen gives inspector good look at weld quality. If it shows defects, a new weld is carefully supervised, and immediate steps are taken to correct the problem at the source. This is but one way in which Bethlehem upholds high level of quality on all freight cars.

What's this? Deliberately cutting up the center-sill cover-plate on a brand new piggyback flat car?

That's exactly what he's up to. He's holding a weld-prober, which cut the little boat-shaped specimen from the butt-welded joint in foreground. The specimen gives this quality control engineer a good look at the workmanship in the weld. If he spots any defects, such as slag inclusions, cracks, porosity, lack of fusion or penetration, he'll know what to do about them—and he'll do it.

The soundness of every weld and the quality of each part are essential to the service life of a whole freight car. That's why Bethlehem's quality control engineers are in the shops at all times, checking on every detail of construction, helping to overcome difficulties, often suggesting improvements.

It's paying off, too. We're developing such a high standard of excellence in car construction that one of these days we believe you will find it unnecessary to inspect our product. You will pocket the savings. We'd like to demonstrate our ideas of quality on your next order.

BETHLEHEM STEEL COMPANY, Bethlehem, Pa.
Export Sales: Bethlehem Steel Export Corporation



for Strength
... Economy
... Versatility

BETHLEHEM STEEL





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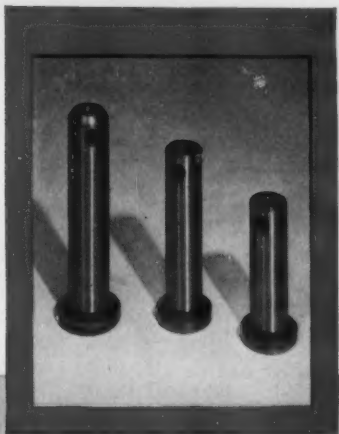


Squeeze the last drop out of your cleaning dollars with NUVAT

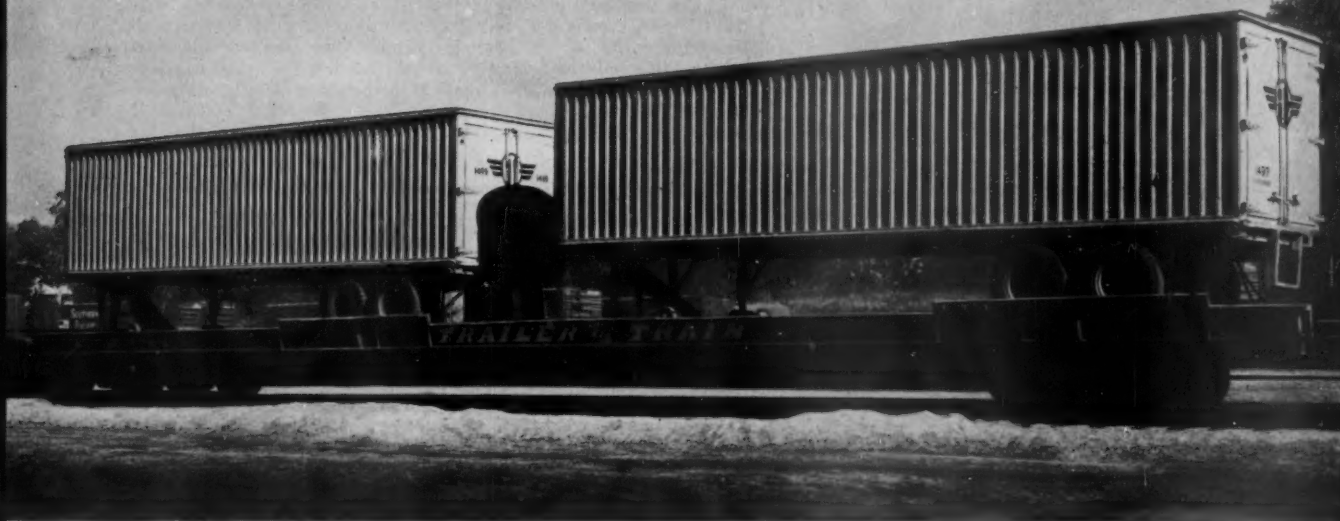
NUVAT, Wyandotte's heavy-duty vat cleaner, cuts your cleaning costs three ways. It rapidly removes soils other vat cleaners won't touch—there are no do-overs, no hand cleaning on benches. You spend less time rinsing because NUVAT solutions don't deposit scum on parts or tanks. And NUVAT lasts longer in your tank—cutting dumping downtime and the need for frequent material additions. Prove NUVAT for yourself. Call in your Wyandotte railroad-cleaning specialist.

Wyandotte Chemicals
J. B. FORD DIVISION

WYANDOTTE, MICHIGAN • LOS NIETOS, CALIFORNIA • ATLANTA, GEORGIA



PAYLOAD: Piggyback Pays Off with Dependable Equipment



Less than 5 years ago the Trailer Train piggyback system of freight transportation began . . . with only two members. Today it covers 75% of the Nation's Class 1 railroad mileage.

Piggyback is still growing. And its fast, rugged cross-country service is making greater demands on railroad cars and their parts.

That's why Ex-Cell-O "Diamond Hard" pins are specified for all new cars added to the Trailer Train fleet. Hardened and ground

Ex-Cell-O pins with their super-fine finish, deep steel case and ductile core provide greater resistance to wear, abrasion and shock . . . Ex-Cell-O qualities that mean maximum, trouble-free service.

Proven performance in both pins and bushings, plus Ex-Cell-O standardization, variety of sizes, immediate delivery and service mean lower operating cost. For the full story on how Ex-Cell-O can help your maintenance operation, contact your local Representative or write Ex-Cell-O direct.

61-BRR

EX-CELL-O FOR PRECISION



Railroad Division

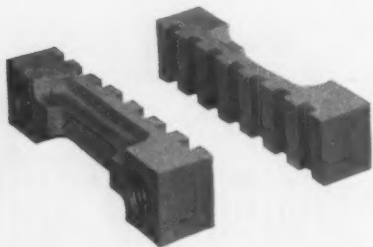
EX-CELL-O
CORPORATION
DETROIT 33, MICHIGAN

STABILIZED JOURNALS—

Now MAGNUS offers you three low-cost ways to get

BETTER BEARING PERFORMANCE

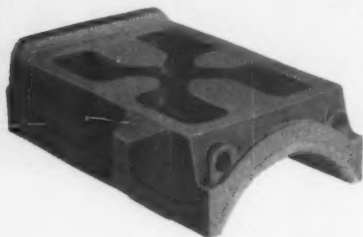
1. MAGNUS R-S JOURNAL STOPS



Provide maximum stabilization of entire journal box assembly—increases miles per hot box ten times

Bolted to the inside of the box, on both sides of the journal, Magnus R-S Journal Stops positively prevent excessive displacement of bearing, wedge or lubricator pad, even under severe humping, braking or road impacts. By stabilizing the entire journal bearing assembly they eliminate the major causes of bearing failures—*increase miles per hot box ten times; miles per cut journal, fifteen times!* In short, they cut maintenance and operating costs all along the line—double bearing and dust guard life, reduce wheel flange wear, extend the maximum safe period between repacks.

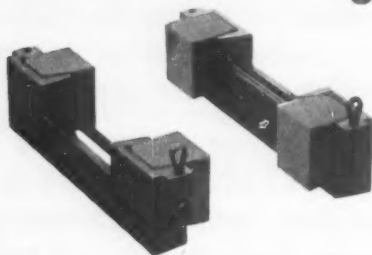
2. MAGNUS FLAT-BACK SOLID BEARINGS



Wider, non-tilting design limits bearing displacement—provides effective stabilization at lower cost

The Magnus flat-back bearing design provides the most economical means of stabilizing the journal box assembly, and has proved highly effective for many types of service. Its greater width, increased angle of journal contact and full-area contact with the flat wedge inherently limit the fore-and-aft movement of the journal within the box under road shocks and switching impacts. This restriction of movement protects the dust-guard, reduces loss of oil through enlarged dust-guard openings and tends to prevent spread linings in the bearing.

3. MAGSTOPS



Offer the inherent advantages of R-S Journal Stops in a low-cost, rugged, fabricated design

Here's a new approach to the problem of journal box stabilization—a low-cost fabricated journal stop with forged steel frames and renewable bronze inserts that hold the journal in the center of the box even under the most severe car impacts. The frames are welded to the inside of the journal box and need never again be removed. Wear occurs only on the brass inserts, which are easily and inexpensively replaced during wheel changes, without any special tools.

The next big step toward better bearing performance will be the adoption of effective means of stabilizing the journal assembly—for this is the most economical way to reduce hot boxes. Magnus, the pioneer in journal stabilization, now offers you *three ways* to achieve this result at low cost. All have been approved by the AAR for test installations in interchange service. Ask your Magnus representative to discuss with you the most effective solution to this problem. Or write to Magnus Metal Corporation, 111 Broadway, New York 4, or 80 E. Jackson Blvd., Chicago.

MAGNUS METAL CORPORATION

Subsidiary of
NATIONAL LEAD COMPANY





Mechanical Division officers at head table at opening of the "limited business meeting" on Wednesday, June 28. Left to right: F. H. Stremmel, secretary; C. B. Rogers, assistant to secretary; Fred Peronto, executive vice-chairman; J. W. Hawthorne (chief mechanical officer, ACL), chairman, and J. A. Welsch (general superintendent motive power, IC), vice-chairman.

Two-day 1961 session, held at Chicago's Hotel Sherman, was attended by General Committee, technical committee chairmen, and chief mechanical officers of roads not represented on General Committee.



Mechanical Division Cutting RR Costs

Group stresses standardization and simplification in equipment design, maintenance, and accounting

Increased freight car load limits, gradual elimination of all cast-iron wheels on interchange freight cars, and simplification of interline car repair billing are being submitted to letter ballot by the AAR Mechanical Division. At last month's "limited annual business session," the General Committee acted to recommend these items for vote, and took other actions expected to aid the hard-pressed industry in controlling costs and improving the quality and reliability of its service.

Higher freight car payloads have been under study by the Mechanical and Operating - Transportation Divisions for some time. After considering the ability of car structures, trucks, and axles to operate satisfactorily under heavier loads, the Mechanical Division

has proposed an increase of 5 percent in the stencilled load limits of all freight cars.

AAR Research reported that the higher loads could be carried safely by present axles. The 5 percent increase, if approved, will be effective on January 1, 1962.

Another proposed action will ban cast iron wheels on all interchange cars after 1967. Its investigations have assured the General Committee that there is sufficient steel-wheel production capacity in the U.S. and Canada so no shortage could develop during this changeover.

While reporting progress on the elimination of waste packing and in reducing hot boxes, the Committee warned that some car owners have been slow in applying lubricators.

These devices are required on all cars after January 1, 1962.

Numerous changes are proposed for the recording and billing of repairs to interchange freight and passenger cars. These will make it possible for railroads to use machine billing for interline settlements.

The letter ballot will contain a proposal to standardize many of the body components of 40- and 50-ft box cars. Adoption of AAR standards can reduce the costs of many parts now tailored to the specifications of individual railroads.

A thorough analysis of draft gear performance is being made by the Research Center and the Committee on Couplers and Draft Gears.

Next year's meeting, to coincide with sessions of the Purchases and

Division Chairman Says...

Standardization Offers New Economies

Today, the mechanical officer faces problems far more complex and difficult than those faced by his predecessors. Lower traffic levels have reduced funds available for maintenance. Simultaneously, the mechanical officer must cope with more stringent government regulation and with labor organizations which have obtained fringe benefits that now make up a large portion of his labor costs.

The railroad industry is engaged in a fight for its very existence, striving to survive as a group of privately owned common carriers. The present wave of mergers is evidence of the efforts being made to reduce the costs of operating our railroad plant.

Mechanical officers must do their part in reducing costs. In the past, the diesel locomotive made possible economies in maintenance and servicing; mechanical departments have been able to consolidate many shops and enginehouses. Such actions did reduce railroad operating costs. However, those economies have already been absorbed by higher material costs, higher wage rates, and increasingly expensive fringe benefits. Mechanical Departments are engaged in a grotesque game of tag, attempting to

institute labor and material savings at a faster rate than these costs increase.

There are still many avenues for economy open to alert mechanical officers. Not the least of these is standardization of freight-car parts which can reduce material inventories and, by making possible faster repairs, permit a smaller number of cars to handle any given traffic volume. No railroad, regardless of its size, can accomplish any degree of standardization by itself. The very nature of the operation of the American car fleet means that only combined action by all railroads can make possible standardized repairs with standardized parts.

To permit cars to be freely interchanged and to establish uniform maintenance standards, the railroads many years ago formed a trade association which has become today's Mechanical Division of the Association of American Railroads. Only through this agency can railroads achieve the standardization necessary to enable them to handle their freight traffic with the fewest possible units of equipment.

The Mechanical Division's committees assigned to establish standards for rolling stock and motive power are com-

posed of technical men employed by member lines. Committee members are not paid by the AAR for their activities; all expenses involved in their AAR work are borne by their own railroads. In addition to their meetings twice yearly, many items are handled by correspondence. Although the members contribute much of their personal time to this AAR work, their roads necessarily lose many hours of their service.

If all railroad managements fully appreciated the importance of the Mechanical Division and its potential for economies, there is no doubt that many more mechanical department representatives would attend annual meetings and that more railroads would be represented on technical committees. Despite a rather general lack of understanding of its work, the fact remains that the standards established by the Mechanical Division do benefit the entire industry. Unless all participate in its activities, it will not be possible to take full advantage of the economies available through standardization, simultaneously providing more reliable, lower cost transportation.

—J. W. Hawthorne
Chairman

Stores Division, is scheduled for Chicago on June 12, 13 and 14, 1962. Final decision depends on economic conditions prevailing at that time.

Committee chairmen and vice-chairmen are to serve 3-yr terms under the Division's Articles of Organization adopted last year. It is expected that several new committee heads will be named shortly. Division Chairman J. W. Hawthorne and Vice-Chairman J. A. Welsch have served the first year of their 2-yr terms.

Summaries of committee actions appear on the following pages.



General Committee has two new members, again bringing its membership to 15. W. D. Dickie, (left), chief of motive power and rolling stock of the Canadian Pacific, and E. F. Tuck (right), chief mechanical officer of the Frisco, were elected to fill vacancies produced by retirement of L. R. Christy of the Missouri Pacific and promotion of E. Wynne of the Canadian National.

Roller Bearing Installations Are Increasing

Freight cars with roller bearings totalled 98,593 as of March 31, 1961, an increase of 16,178 cars — 19.7% — over a year ago. These figures were compiled by the Committee on Journal Roller Bearings which makes an annual survey of roller-bearing installations.

Design changes of the junction of the outer pedestal leg and top of AAR alternate-standard pedestal-type freight-car truck side frames are intended to prevent the structural failures which have occurred at this point. A stronger pedestal key, to be submitted to letter ballot, has been designed by the Roller Bearing Manufacturers Engineering Committee. Its strength is expected to prevent roller-bearing wheel and axle assemblies from coming out of trucks during derailments.

Conditional certificate of approval has been issued to SKF covering a design change in the SKF Expediter general-purpose roller-bearing cage. SKF has also re-

ceived conditional approval for its Piggy-backer Class E special purpose spherical journal roller bearing.

The committee also reported that the certificate of approval covering Hyatt Hy-Roll Taper journal bearing covers Classes D, E, and F, not C, D, and E previously reported.

Because of satisfactory performance of Brenco roller bearings, Brenco has been authorized to increase its applications from 100 to 500 car sets.

A track arrangement for storing roller-bearing wheel and axle assemblies and a rack arrangement for wheel cars have been completed by the Committee. Both are designed to prevent damage to bearings in storage and transit. On standard "gauntlet" type wheel storage tracks the rails should be 3¾ in. apart. On wheel cars the axle-center distance is 23 in. for 33-in. wheels. Both prevent flanges from contacting the exteriors of bearings.

Freight Cars Equipped with Roller Bearings

March 31, 1961

	Hopper	Box	Gondola	Flat	Other	Total
Railroads	26,670	25,946	4,697	6,824	9,479	73,616
Private Car Owners	499	850	—	7,678	7,969	16,996
Non-interchange cars	65	48	3,160	343	4,365	7,981
Totals	27,234	26,844	7,857	14,845	21,813	98,593

Diesel Hydraulics Have Higher Ratings

Increasing interest in high-horsepower hydraulic transmission for diesel locomotives has been reported by the Committee on Locomotives and Locomotive Fuels and Lubricants. In addition to the six 4,000-hp C-C type A units nearing completion at the Krauss Maffei plant in Germany for the Denver & Rio Grande Western and the Southern Pacific, the Committee has studied the high-power units of European railroads. For high-power foreign diesels, hydraulic transmissions are usually either the Mekhydro or Voith type, both of which are claimed to have an overall transmission efficiency of 80 per cent.

This efficiency is achieved despite the narrow speed ranges in which torque converters give satisfactory performance. The Mekhydro transmission utilizes a gear train which functions to maintain the speed of the torque converter in an efficient range as locomotive speed varies. The Voith transmission has a series of torque converters which are individually effective in different speed ranges (RL&C, Feb. 1961, p 21).

Electro-Motive will do nothing further with the free-piston engine on locomotives. Road testing of the 2,000-hp experimental free-piston gasifier and turbine-electric locomotive, originally scheduled during 1959, has been indefinitely postponed.

Gas Turbines

The experimental 4,500-hp coal-fired GTE locomotive being built by the Union Pacific to evaluate components developed by the Locomotive Development Committee (RL&C, Sept. 1957, p 37) is approximately half completed. Initial stationary testing is expected to begin late in 1961, followed by road testing at Cheyenne, Wyo.

The UP expects to receive the last of 30 8,500-hp oil-fired gas-turbine electrics this month, bringing its total ownership to 55. The 25 4,500-hp locomotives continue in service between Council Bluffs, Iowa, and Ogden, Utah. They have generally been operated in multiple with one or more trailing diesel units. In 1960, the locomotives produced 10.3% of the freight gross ton-miles on the UP, averaging 6,552 miles per month.

The 4,870-hp gas turbines in the above locomotives have accumulated 758,633 fired hours to December 31, 1960. Since 1952, one of these turbines has 35,047 fired hours.

During 1960, 12 additional 8,500-hp gas turbines were put in service, increasing UP ownership from 11 to 23 units. Operating over the same territory as the 4,500-hp locomotives, the 8,500-hp units averaged 10,477 miles per month in 1960 and produced 10.9% of the freight gross ton-miles (RL&C, April 1961, p 24).

Fuel Oil Filters

The Committee has prepared a specification for letter ballot action on throw-away type fuel-oil filter elements used on the discharge side of the locomotive fuel transfer pumps. The specification does not cover suction or discharge filters of the cleanable type. It does not cover the filter element housing.

The specification is expected to accomplish the following objectives:

- Provide a sound basis on which the railroad industry can establish purchase specifications.

- Require filter manufacturers to furnish sufficient information on their filter elements to essentially eliminate performance or acceptance tests by any railroad.

- Place the responsibility for checking accuracy of the information in the filter manufacturer's catalog with the AAR Research Department.

The specification establishes three classes of filter elements to cover the filtration requirements of the various grades of fuel being used. It places no requirement on filter element life. It does recommend that flow velocity through the filter element not exceed specific values, depending on the class of filter and the viscosity of the fuel. It also recommends that Class I elements not be used with heavy fuels or Class II elements with extra-heavy, economy fuels.

Improved Brake Lubricants Are Available

An air-brake lubricant superior to present standard triple valve oil is available. Following its tests, the Committee on Brakes and Brake Equipment recommended for letter ballot that Specification M-912 be revised to permit the use of this oil which has greater life and better low-temperature performance. The lubricant has a viscosity index of 140 and a pour point of minus 50 deg F. Several railroads have arranged to test AB valve performance over an extended period using this improved lubricant, also using another, known as Silicone SF-81, which is now under study.

Tests of brake-cylinder greases are also being made to find a longer lasting, all-weather lubricant. Road service tests are now under way to select the best and most economical lubricant. The AAR Research Center, National Research Council of Canada, and brake manufacturers are all engaged in this work.

Much brake-pipe and cylinder leakage is due to breaking of pipes at threaded sections. Because the threadless type fittings virtually eliminate this, the Committee recommended that Interchange Rule 3 require flanged-type, threadless air-brake fittings be used on all cars built new, rebuilt, or receiving heavy repairs after January 1, 1962, for all pipe sizes 1 in. and smaller. Conditional approval has also been given to a modification of the compression-type,

Results of a questionnaire to 28 member roads for the number and location of cracks in diesel locomotive axles over a one-year period show 49.5% reported were between the wheel and gear seats. Successful use of stress relief grooves is reported by one major road where it is now a standard practice for new axles. The section modulus of the stress relief groove is 85% that of the wheel seat.

The Committee reports that Vapor Phase equipment in locomotive diesel engines has proved uneconomical and impractical (RL&C, Jan. 1959, p 32). This pressurized cooling system seemed successful, because it did improve combustion and reduce wear rates when heavy fuel was used. The complicated equipment caused operating difficulties and required special servicing and fueling facilities.

The newly organized Committee on Electrical Equipment — Rolling Stock, which has taken on the functions of the former AAR Electrical Section, has completed a specification for shipment of batteries.

flanged union fitting which has been introduced by the air-brake manufacturers. This fitting has improved sealing characteristics, simplified seal renewal, and is interchangeable with present standard fitting.

Service performance of AC-1-B brake equipment applied to passenger cars has been generally satisfactory. Changes in the rubber diaphragm material have corrected difficulties encountered with these portions. AC brakes applied to GN ore cars have more than four years' service, and a summary report of an inspection made May 23, 1961, is being prepared.

Locations of angle cocks on cars having sliding center sills, long travel, and long overhang from truck to end sill have proved to be a complex problem. The Committee recommends that angle cocks be located under the coupler shank as is done on lightweight passenger cars. This arrangement would eliminate the right angle elbows and long flexible hoses introduced by car builders.

Two types of on-tread composition brake shoes, approved for application to 1,100 interchange cars, have not yet seen sufficient service to evaluate performance of these shoes.

Three types of off-tread brakes each have approval for application to 250 cars. Frequent inspections have indicated satisfactory performance, and these inspections will continue.

Box-Car Components To Be Standard

Standardization of side doors, sides, ends, and roofs of conventional 50-ton general-purpose box cars has been proposed by the Committee on Freight and Passenger Car Construction. Cooperating with the Purchases and Stores Division, which reported that railroads are paying extra costs because of their failure to standardize these components, the Committee has prepared specifications and drawings which will be

submitted for letter ballot.

Components are for both 40-ft and 50-ft cars having single-sliding, plug-type, double-sliding, or combination sliding-and-plug-type side doors. Inside car lengths will be 40 ft 6 in. and 50 ft 6 in., respectively. Inside widths will be 9 ft 4 in. standard, and 9 ft 2 in. and 9 ft 6 in. as alternate standards. All single-door openings will be 6, 8, 9, or 10 ft in width. Dou-

ble door openings will be 12, 14, 15 and 16 ft, with 40-ft cars having a maximum permissible door opening of 14 ft. Sheet thicknesses and sizes of rolled and fabricated sections for sides, roofs, and ends have been fixed. Further refinement and standardization of other car parts is under study.

Shipper groups have been seeking to have box cars marked to indicate the size of the door opening. A standard arrangement has been proposed for stencilling the outside of the car door about 4 ft 4 in. above the car floor with this information: **OPENING W O O H O O**. Another proposal to indicate the type of lading device on the side of each box or refrigerator car with an AAR rather than a manufacturer's designation was investigated. It was decided that no action would be taken.

Limiting cross-sectional dimensions of freight cars have been under study by the Committee for several years. The limits are given in Manual Plate B, "Equipment Diagram — Unrestricted for Interchange Service." Increasing length of freight cars led to a proposal at the 1959 meeting that each car with truck centers greater than 41 ft 3 in. have its width reduced to compensate for the increased overhang of its center and ends on curves. This was not adopted but referred back to the Committee for more study.

Recent eliminations of many railroad clearance restrictions have resulted in a new survey to determine if Plate B could be changed. Instead, the Committee has recommended, for letter ballot, that an additional drawing — "Maximum Width of Cars with Various Truck Centers"—to be designated Plate B-1, be included. It relates maximum car width to truck center distance for all truck centers from 39 to 75 ft, but leaves the cross-section limits of the basic car, Plate B, unchanged.

Safety Appliances

Failures of brake steps of hopper cars on which, apparently, car shakers have been used are being investigated by the Committee. Because brake steps of various types and with different supports have been involved, a member road conducted tests of different designs to determine the type best able to resist shaker action. This resulted in a proposal to the Arbitration Committee that all brake steps applied to new and rebuilt cars on which shakers are used for unloading be of an approved perforated type, because this type performed better than the grating type.

Gaps of 1 in. will be allowed between the sections of metal running boards on all cars if a recommendation of the Safety Appliances Committee is approved. The action followed the suggestion of a member road which reported that the presently required $\frac{3}{8}$ in. between sections is not practicable for the removable roof sections of covered gondolas.

Working with the Committee on Safety Appliances, the Car Construction Committee has approved a circular dome platform for tank cars of General American Transportation Corp. and has added the Apex Type S running board to its approved list.

The Safety Appliances group also re-

ported that it is studying the lowering of the hand brake and retainer valve on high-side and house-type cars and is even considering elimination of the retainer.

A proposal to eliminate running boards and their latitudinal extensions on box and house-type cars is being followed. Commenting on this, the Safety Appliances Committee reported: "The elimination of unnecessary appliances which will provide economies in the construction and operation of freight cars without affecting the safety of operation is currently an important railroad industry requirement."

A specification for two-piece rivets applied by hydraulic, pneumatic, or hand-operated tools to take the place of bolts or conventional rivets in the application of safety appliances has been completed. Two-piece rivets of the following manufacturers comply: Townsend Co., Cherry Division of Townsend Co., Standard Pressed Steel Co., Huck Manufacturing Co., and Vaishan Manufacturing Co.

Welding Repairs

Damage to roller bearings on cars and locomotives resulting from improper location of the welding grounds has been of concern to the Car Construction Committee since 1953; the Electrical Section Manual prohibits grounding on the rail or wheel. Current flow through solid bearings can cause similar damage. It has been recommended for letter ballot that the Manual and Interchange Rules 22 and 23 be altered to prohibit location of a ground connection which could produce current flow through any type of journal bearing when welding is in progress on cars.

Welding of high-tensile (Grade C) alloy

cast-steel truck side frames has been a subject of discussion for two years. Differing interpretations of Interchange Rule 23 have been resolved with proposed letter ballot action covering these side frame repairs.

To guard against crack formation, truck side frames of Grade C steel must be preheated before any welding is done. After welding in the shaded areas shown in Fig. 14, the weld must be stress relieved by local heating. After the welding of pedestal liners, these liner welds cannot be stress relieved without destroying the hardened condition of the liners. Normalizing of side frames is not necessary after any welding is done in the shaded areas, but should be mandatory following all welding outside the shaded areas.

A study of bolster and side frame failures made in 1959 led the Car Construction Committee to recommend earlier this year that Interchange Rule 3 be altered to prohibit in interchange after Jan. 1, 1962 those cars having side frames cast prior to 1920, and also to prohibit the use of side frames cast before 1926 on new and rebuilt cars. The Arbitration Committee has since referred this back for further investigation.

Standardization of side frames and bolsters has been jointly investigated with the Purchases and Stores Division and the Truck Manufacturers Engineering Committee. Result is a new AAR Code for Designating Design Features for Side Frames and Bolsters Having Built-In Snubbing Devices and Single-Shoe Brakes. It will give ready identification to interchangeable components and will establish code numbers useful in stocking and purchasing. Revised test procedures for new side frames and bolsters will also be submitted for letter ballot.

New Gage Detects Unserviceable Pads

A new standard gage for checking the resiliency of "pillow-type" lubricator pads will be submitted for letter ballot by the Committee on Lubrication of Cars and Locomotives. Instead of making a simple height check as is done with the present gage, the new device has a foot-operated pedal which compresses the pad during inspection. This will make it possible to determine if pads have, during renovation, lost their resiliency so that there may not be sufficient contact with the journal.

The new device, developed by one of the commercial renovators, has the following advantages according to the Committee:

- Detects excess moisture in core and cover which can then be corrected by a longer renovation period.
- Detects deteriorated core material.
- Results not affected by unusual fluffiness produced during cleaning.

Tests of the new device have shown results which convince the Committee that it will prevent the return of unsatisfactory pads to service.

During the past year the following lubricators have been granted the "Approved for Test" status: Accurate, Almco, Atlas, Crown, Economy, Kar-pak, Landreth-Pak, Royal, and Truk-pak. The following have been advanced to "Conditional Approval" from the "Approved for Test" status: Ab-

sco, Easy-Flo, Premier, Southland, Utility, and Wikit.

Working with the Committee on Freight and Passenger Car Construction, a study has been completed on non-standard journal boxes which might complicate the application of standard lubricating devices.

Boxes having transverse ribs in the interior should have these ribs cut out to assure that the lubricator will function properly, the committee reported. It is proposed to alter Paragraphs 6 and 7 of Rule 66 to permit the use of pad type lubricators which do not extend laterally beyond the journal limits in non-standard journal boxes.

Instructions for the free oiling of journal boxes, Section k of the Lubrication Manual, will be modified if a proposed revision wins letter ballot approval. It will call for placing some oil on top of lubricator pad in extremely cold weather during the course of bringing the free oil level to the present standard $\frac{1}{2}$ -in. depth.

Following difficulty experienced with the H-type solid journal bearing which resulted in its redesign and designation as the I type (RL&C, April 1961, p 45), an investigation of wedges was undertaken. Wedges were credited with causing much of the trouble experienced with the H bearing. Cooperating with the Car Construction Committee,

several conditions are being studied: stricter requirements for manufacture and reclamation of wedges; more rigid standards for continuing wedges in service; and new credits to be allowed for them in interline billing.

The Committee on Lubrication reported that road tests of the 170-deg flat-back bearing show it is controlling journal movement. The bearing was subjected to impact tests at the AAR Research Center which reported "somewhat improved stability under impact conditions up to about 8 mph when compared with the present standard journal bearing without journal stops."

The journal stop also continues to show "remarkable results" in prolonging the service obtained from bearings, dust guards, rear seals and lubricators, and also in pre-

venting displacement of the lubricator. The following stops have been granted approval for test during the past year: Magnus, Zytel 2-M Nylon, and Zytel 424 Nylon types. An additional rear box seal, the Hennessey AR-12, has also been granted test approval.

Extension of relubrication periods for both roller bearings and cartridge type solid bearings continues under investigation. Referring to the sleeve, or cartridge type,

the committee reported that "with proper modification" of the bearing, its lubrication probably can be extended from the present 90-day interval to "beyond six months." Already 6-month relubrication is under test.

Relubrication of all types of rotating-end-cap roller bearings at 36-month intervals and during wheel changes is under study. Such periods are already allowed for Timken bearings, and tests now in progress will decide if it can be extended to others.

No Cast-Iron Wheels After 1967

More stringent condemning limits imposed in the past two years have not proved effective in reducing cast-iron wheel failures. The Committee on Wheels and Axles

recommended, in effect, that no cast wheels be manufactured after 1963. The General Committee has since expanded this by proposing, for letter ballot, that all chilled-iron

Preview of 1962 Interchange Rules

Numerous changes have been recommended for the present interchange Rules by the Arbitration Committee. Many will be submitted to letter ballot. It is probable that the next revision will incorporate most of the changes. Rule number, section and paragraph follow in that order, unless otherwise indicated.

Rule 3-a-4.—Modification will indicate that extra heavy fittings are to be used with the extra heavy pipe required for air-brake piping on new and repaired cars. Rule 17 will be modified accordingly.

Rule 3-a-7. — Modification will fix the location of angle cocks on cars having Type F interlocking couplers, requiring compliance with Page E-28A of the Manual.

Rule 3-b-5.—Elimination of Note 1 pertaining to bottom rod guard safety supports will remove conflict with Rules 3-b-5 and Rule 17-m.

Rule 3-c-10.—Addition of new paragraph will emphasize mandatory nature of standard air-brake stenciling required on all cars by Rule 60.

Rule 3-w-5, 6, and 7.—Modification of Paragraph 5 will ban cast-iron wheels on all cars in interchange after January 1, 1968; addition of new Paragraph 6 will prohibit use of cast-iron wheels manufactured after January 1, 1964; present Paragraph 6 will be renumbered 7. This proposal, to be a letter ballot item, is called "an orderly plan to eliminate cast-iron wheels without needless loss of serviceable material. . . ."

Rule 4-f-3.—Modification will indicate that any hole larger than 6 in. in any dimension in the side or end of an open-top car is a defect.

Rule 7.—Modification, a letter ballot item, will allow use of billing repair forms and procedures which are arranged for machine accounting of interline billing. Similar changes in Rules 8, 93, and 96.

Rule 10-f-8.—Addition of new paragraph will provide for use of Experimental Type A, 28-in. diameter, one-wear, cast-steel wheels as recommended by Committee on Wheels and Axles.

Rule 16-4.—Modification of paragraph with a tabular specification of free heights and condemning spring loads for freight-car springs so second-hand springs having lost half of reserve travel at maximum working load will not be installed in cars.

Rule 17—n, o and v. — Modifications will eliminate references to charges and credits no longer proper because net applied prices have been adopted for truck bolsters, side frames, and running boards.

Rule 17—f, n, o, r, and u.—Modification and addition of paragraphs will make Rule 17 consistent with Rule 101 in which net applied charges are now established for bolsters, side frames, running boards, steps, retaining valves, hand brakes, and bottom rod safety supports.

Rule 17-t.—Modification will establish conditions for renewing journal lubricators removed when changing wheel sets. Similar change will be made in Rule 65. Interpretation m-10 modification will add ice temperature control devices, the diesel-powered air-circulating system recently introduced for bunker refrigerator cars.

Rule 18-f.—Modification will require removal of worn draft keys when there is $\frac{3}{16}$ in. wear at any point.

Rule 30-b.—Modification will add covered hoppers to list of cars (2) which are to be light-weighted only by owner, or owner's agent, and will eliminate them from 30-month reweighing.

Rule 32-10-k. — Modification of Note 2 will add "other heating device" and specify that handling line is responsible for damage to rubber draft gears, automatic slack adjusters, wheels and axles, and other parts rendered inoperative, as well as to center sills and air brakes.

Rule 32-11.—Modification will add "handling-line damage to container" so that responsibility for containers, removable roofs, and covers will be established in cases where there is no damage to the car.

Rule 60.—Modification and rearrangement of Rule 60 in its entirety will cover periodic attention to air-brake equipment and results from deletion of certain air-brake information from Rule 101 and elimination of Rule 111.

Rule 61-d.—Eliminated because this portion pertaining to in-date testing has been incorporated in Rule 60 with other air-brake details.

Rule 66-g.—Modification will indicate that only new lubricators are to be used when waste is being replaced.

Rule 66-h-2.—Modification will indicate that stenciling indicating non-standard repack periods is to be eliminated and the cars stenciled to indicate standard repack intervals.

Rule 66-h-4.—New Item 8 will be added indicating "Removed account change of wheels and axles (two lubricating devices for one pair of wheels in a separable box truck and four devices in an integral box truck)."

Rule 85.—Modification of third paragraph will indicate that a failure of cartridge type journal bearings will not be allowed if the car is more than 30 days overdue for periodic lubrication, or if the date cannot be read on the car.

Rule 93.—Complete revision, a letter ballot item, will permit machine accounting for interline billing.

Rule 96.—Modification, a letter ballot item, will allow group billing and remove restrictions on "adding machine tape only."

Rule 101. — Regular modification will include new material and labor prices and changes in lists of approved brake-beam supports, journal lubricating devices, metal running boards.

Rule 104.—Rule will be completely eliminated because data is covered in Rules 101 and 105.

wheels be banned from interchange equipment on January 1, 1968.

Service failures of Class C [high carbon] wrought-steel wheels under cars operating in passenger service have resulted in a recommendation that these wheels be prohibited under passenger cars equipped with tread brakes. This type of wheel was designed to be used with disc brakes.

The 33-in., two-wear, wrought-steel wheel, presently designated as AAR X-6, would be restored as a standard AAR design if the committee's letter ballot recommendation wins approval. This wheel, with 2-in. rim thickness, is needed today for applications on roller-bearing cars in order that wheel life will "more nearly approximate bearing life," the committee reported. In addition, a 33-in., two-wear, Class B cast-steel wheel has been authorized for test under 2,000 interchange freight cars and has been designated AAR X-9.

Wheel requirements for high-capacity cars and for low-deck cars are being developed by means of interchange-service tests on other cast-steel wheels. Cars in excess of 70-ton nominal capacity must now have 36-in. wheels, and the committee authorized the manufacture of 7,000 car sets of Class A and Class B cast-steel wheels in this size to be designated as follows: AAR X11—one wear; AAR X12—two

wear, and AAR X13—Multiple wear.

To make possible lower decks on piggy-back cars, the 28-in. wheel has been introduced. Authorized have been 1,000 car sets of 28-in. Type A cast-steel wheels, and 1,000 car sets of 28-in. Type B cast-steel wheels designated AAR X-8 and AAR X-10, respectively.

Increased fatigue strength for freight-car and locomotive axles has been a major concern of the Committee and the AAR's Chicago Research Center for some years. A test program involving conventional locomotive axles made of AAR Specification M-126 Grade H steel has been completed, and a second program comparing Grade H axles with Grade F axles is now in progress. Commenting on the completed test, the committee reported "good correlation with the results of the fatigue test data from investigations made during the development of the raised-wheel-seat passenger-car axles." Fatigue failures induced under very high loads resulted in fractures in the wheel seat next to the gear seat about 2 in. into the wheel bore from the inner hub.

Investigations of the alternate standard "as forged" body, raised-wheel-seat, freight-car axle adopted in 1955 have shown that this axle may not have the life of the standard passenger-car axle after which it was

patterned. Present-day operation of freight cars at full capacity and high speeds may result in the need for a freight-car axle with endurance limits comparable to the present design passenger-car axle. Testing indicates lack of uniformity in the fatigue endurance limit of the "as forged," non-heat-treated and unmachined axle body. Endurance limits 4,000 psi below that usually found for car-axle bodies have been observed. Internal residual stresses in the forged surface are also indicated.

Although heat treatment was found to be of benefit in improving the fatigue life of the unmachined body, additional cost would likely cancel the price advantage of this axle. It is questionable that forging can produce a smooth surface axle body to close tolerances without a considerable increase in cost. The committee concludes that it may be more economical to forge axle to coarser tolerances and rough machine the body to the dimensions of the passenger-car axle. This change would permit this freight-car axle to be manufactured in the same way as plain-bearing passenger-car axles, except for the smooth machining required for the coach axles. Additional data on the residual stresses in the press fit of the wheel on the wheel seat may make it necessary to increase the wheel-seat diameter.



H. M. Wood

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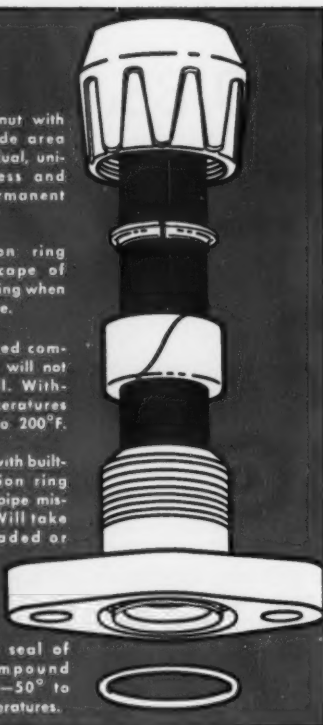
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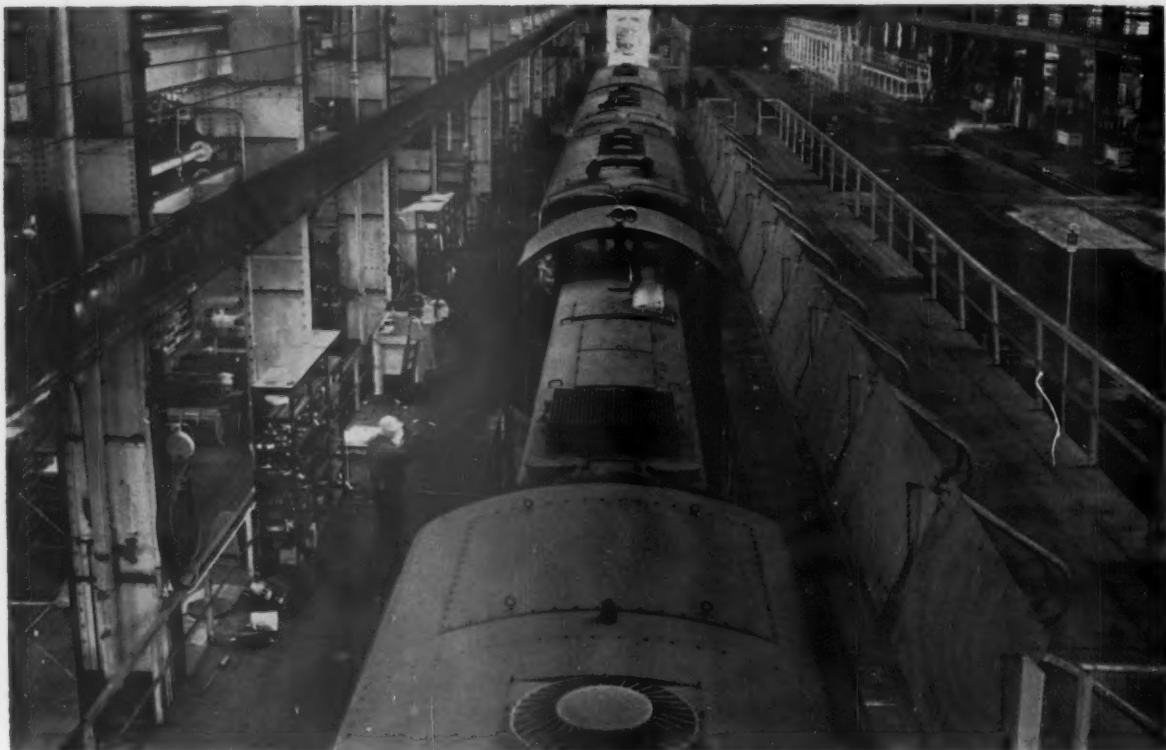
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Five of the seven spots are inside the shop, a building formerly part of the Cumberland heavy-repair facility.

Spot Shop to Maintain 540 B&O Units

Half of road's motive power is to be handled at Cumberland when program's last phase is complete.

A spot repair facility established by the Baltimore & Ohio at Cumberland, Md., will be performing the ICC inspections and preventive maintenance on approximately half the road's motive power.

Since May 1, the seven-spot facility has been responsible for monthly work on 375 units which include Alco road freight and yard units, and General Motors road freight and road switcher units. The B&O motive-power department has successfully solved the problems of maintaining several types of units produced by two builders on the same progressive maintenance line. This is done without changing the working time at the spots, with almost no changes in manpower assignments and with no attempt to classify units so that only one type, or those produced by one builder, would be on the line at any given time. Instead, units go through the seven spots as they are

received in Cumberland and each unit remains at each individual spot for 70 min.

All this is the result of exhaustive studies made under the direction of F. B. Rykoskey, chief mechanical officer, and W. A. Mullen, superintendent of mechanical methods. The first phase of the program was initiated in March when 261 units were assigned to Cumberland for progressive work on a single-shift, seven-days-per-week basis. Addition of a second shift on May 1 brought the assignment to 375 units. This summer, a third trick operation will be started and the assignment of units will be increased to 540.

The shop, a portion of the former Cumberland back shop, is 505 ft long. Spots 2 through 5 are within this building. Spot 1, for preliminary inspection, is just outside the building where units can be given initial checks with engines running. Spot 7, also outside,

is adjacent to the door through which units pass as they leave the shop building.

At the seven work stations the following operations are performed:

Spot 1. Inbound running inspection.

Spot 2. ICC inspection and examination of cranks and air boxes and mechanical running repairs.

Spot 3. Truck repairs, electrical and mechanical running repairs, and lubrication.


Spot 4. Coupler, draft-gear and carbody work, plus drop-pit work, if necessary.

Spot 5. Replacement of engine and carbody air filters and electrical and mechanical running repairs.

Spot 6. Final ICC inspection, both electrical and mechanical.

Spot 7. Thorough interior and exterior cleaning of locomotive.

(Continued on page 35)



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R. M. Shaver

The Unitized Underframe... How Important is it to the Railroads and Their Revenues?

**How important is the
unitized underframe?**

**"Very," says carbuilder Shaver.
Here are the reasons why.**

Q. Mr. Shaver, the automotive industry has talked about the "unitized" auto body for quite some time. Railroaders and carbuilders often refer to "unitized" construction. Does it mean the same thing?

A. Somewhat. Except that when we talk about it we are not quite so inclusive as the automotive people. We are usually discussing a unitized component of the freight car, normally the underframe. They mean the entire structure.

Q. Are the advantages of the unitized freight car underframe generally the same as with automotive construction?

A. Our problems differ, of course, but the general advantages we are able to achieve are about the same. They grow out of the definition of unitizing. That is: A structure that is designed as a unit and manufactured as a unit . . . consider it as a balanced, major car component if you will. I think this is the important qualification to keep in mind . . . *balance*. The all-welded, unitized underframe provides a good balanced structure where each member is designed to work *with* each other and balanced to work with the rest of the car components.

Q. How about some specifics?

A. Every piece in the underframe, every part from striker to bolster, through center sill to crossbearers and stringers, must be designed so that it works best with every other part. Not in spite of, or individually, but *with* each part. This means that in engineering freight car underframes we must anticipate the strength requirements of each underframe part. Too much or too little strength in one part will effect other parts or areas. Again, we design the parts to work together and make them into an integral or "unitized" weldment.

Q. Could you relate this strength and balance to a particular underframe segment?

A. Yes, let's take the welded bolster and draft sill in the Pullman-Standard underframe. This area of the underframe must offer exceptional strength, but it must provide this strength within weight limitations that are appropriate to its function and to the service of the underframe overall. Cast units are rigid and strong, but usually require a heavy mass and weight of metal to gain their strength. This "beef", however, isn't the answer if you are going to achieve the most efficient product.

Q. Makes sense. Anything else?

A. There certainly is. Flexibility at this point in the structure is extremely important. The properly designed bolster having properly engineered flexibility and capacity for temporary deflection must do its part—and it's a substantial one.

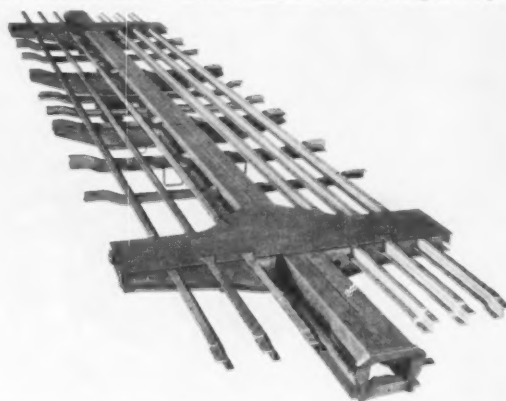
It must help relieve and properly distribute shocks over the

remainder of the underframe and car. Too much stiffness here can cause the stress to "bunch-up" and damage the car structure at its bolster connection. Many times a heavy, rigid bolster and draft sill is not balanced with the rest of the underframe and simply acts as a transmitter of this excessive energy. Serious damage to structural members of the car body can result.

Q. How about over the long haul?

A. Here's where the biggest payoff comes in. In repairability, for example. Repairs to a welded structure are usually not hard to make. The tools, the craftsmen and the materials are in any railroad shop and available at most rip tracks. This isn't so in many other cases, for example, where repairs to cast units are involved.

And finally, and the most dramatic demonstration of the reliability of the unitized, welded underframe over the long haul, is the service record. Since we began building the welded draft sill units in 1935, we have built and put into service over 250,000 car sets of them. Welded draft sills and bolsters proved so successful they were made the standard when we began building the PS-1 Box Car in 1947. Nearly 100,000 of these cars are now in service and underframe repair require-



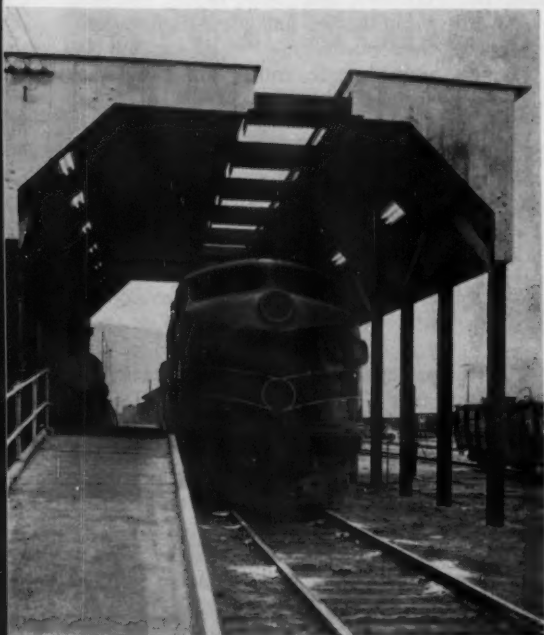
ments have been minimal. With this much service experience you know what to expect with the P-S welded underframe.

Q. What about improvements and testing?

A. This good service record didn't just happen. Our units are thoroughly tested, checked, changed where needed, retested and rechecked.

Our first all-welded underframe, which, over the years, has been constantly improved on, was probably the most tested freight car component ever built. The P-S Research & Development Department, and outside laboratories, did their best to find weaknesses, first in each part; then in the overall unit. Even the welding rod we use was tested. Incidentally, we still test each new shipment of welding rod. It's got to meet our specifications or back it goes. It's the design, experience and this attention to detail that make P-S welded underframes the best in the industry.

Spot Shop to Maintain 540 B&O Units . . .



First spot on the line is this shelter adjacent to main shop door where units are given preliminary inspection.



Storage racks for locomotive components and hose reels for supplies needed during servicing are conveniently located adjacent to the work sites.

(Continued from page 30)

While these are general descriptions of the jobs at each work station, there are some variations between the work done on different types of units. However, the handling of Alco and General Motors units presents no unusual manpower, facility, or tooling problems.

According to Mr. Rykoskey, the centralization of diesel repairs on a progressive line basis is the most significant advancement in the Mechanical department since dieselization. This system has proved to give better maintenance quicker, at more economical cost. The overall out-of-service time for monthly maintenance has been reduced 50%.

Intermediate Work

Cumberland is virtually the "hub" of the B&O system, being the point where the Chicago and St. Louis lines diverge and from which eastward trains operate to Washington, or to Baltimore, Philadelphia, and New York. The normal dispatchments at Cumberland average 115 to 120 units daily. Since this is the largest terminal on the B&O, the regular shopping of the locomotive units presents no problem. The most modern classification yard on the B&O has been constructed



Hose reels and supply racks are installed for use by men working on lower shop level. Work is arranged so there will be a minimum of interference between men doing different jobs.

at Cumberland, and the yard locomotives from this facility are also handled in the Cumberland shop.

Normally, more than half the units assigned periodic for work do not return to Cumberland more often than once in 30 days. While it is intended that units will be prepared for this interval of service when they do come in, the B&O has found a certain amount of intermediate work is necessary. There is a "15-day" preventive maintenance cycle covering replacement of engine air filters, checks

of traction gear and motor suspension bearing lubrication, and renewal of Alco lubricating oil filters. These jobs continue to be handled at any terminal where units are inspected and fueled.

To keep locomotives moving in and out of Cumberland shop at the steady pace required by the progressive maintenance system makes essential very close coordination between the B&O's motive power and transportation departments. Because of Cumberland's strategic location, it is possible for all

units to be worked into that point for period maintenance. Almost no dead-heading or movement of light locomotives has been necessary since the new system went into operation.

It is also part of the plan that the progressive system will not be operated at any time when there are so few units that there will not be one at each of the seven work stations. To date, this has been no problem; the line has always been filled and has operated without interruption.

In addition to the preventive maintenance work and monthly ICC inspection which all units receive when

they come to the shop, the quarterly, semi-annual, and annual ICC inspections are made as units pass along the line. It has also been possible to do some heavier and emergency repairs without interfering with the 70-min work intervals. These include periodic replacement of oil cooler cores which is done on a six-months' basis for all Alcos and on an 18-months' basis for GM units. Emergency repairs have included the replacement of individual power assemblies, air compressors, radiator cooling fans, dynamic brake grids, and traction motor and wheel assemblies. The pair

of overhead cranes in the shop can be used for handling roof hatches, compressors, and similar items. The drop pit in the line makes possible not only the replacement of wheel sets, but also swing hangers and coil or elliptic truck springs.

The Work Forces

Along with construction of platforms and installation of new equipment in the shop and the shelter at the Spot 1 position outside, a work area was established where components removed on a routine or emergency basis could be cleaned, rebuilt, or repaired to make them ready for reuse. This area is staffed by a group known as the "support force" which is assigned to work on the progressive line when a unit is found to require emergency repairs, or when one is due for semi-annual or annual ICC inspection. When it is impossible to complete an emergency repair on the line, it is "set back" on another track in the shop and completed by the support gang.

The regular force on the line consists of 22 men covering the seven work stations. These include five machinists, three machinist helpers, five electricians, one electrician helper, four pipe fitters, one carman, two laborers, and one foreman. Exhaustive planning has made it possible for the varied maintenance jobs to be completed without interference. By placing tools and materials at work sites, it has been possible to reduce non-productive time to a minimum.

All moving of units along the line is done by the unit coming to the No. 1 position. This locomotive moves into the shop, advancing all units from one work station to the next. Units are separated after being properly spotted, and the unit which does this is returned to the No. 1 station and is given the preliminary inspection before its engine is shut down. This move requires approximately 6 min. Because there are only five work stations in the 505-ft shop, any unit can be spotted without difficulty. The shop has a warning light and horn system which operates before, and as, the line is moved.

Work Station 4, which includes the drop pit, is long enough so a locomotive can be placed to remove any wheel set or truck without interfering with the units at the two adjacent work stations.



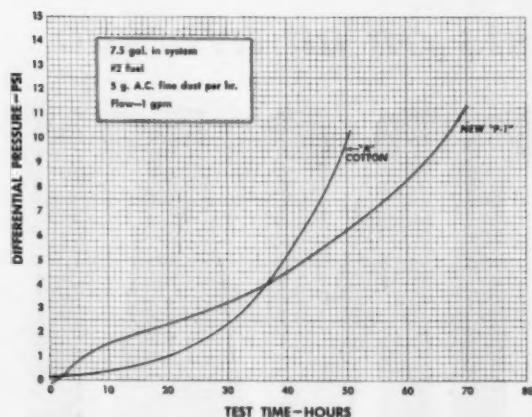
Locomotive at Spot 4 was not placed on drop pit immediately behind it. B&O does make wheel changes and completes similar truck repairs with the drop pit during 70-min. work interval.



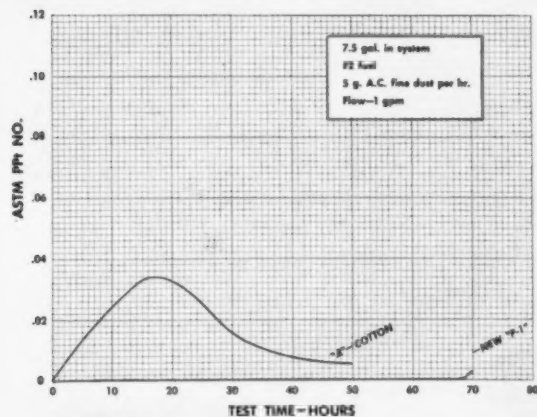
Parts reclamation area is adjacent to spot line. Components removed from locomotives are prepared for reuse. Men in this area work on the line when a unit is found to need special repairs.

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NEW CLEANLINESS IN FUEL AND LUBRICATING OILS EFFECTS MAJOR ECONOMIES IN DIESEL OPERATION



Test to demonstrate the comparative efficiency (retention of contaminants) and flow characteristics (pressure drop) of standard 2nd stage fuel filter cartridge "A" versus the new WIX P-1 pleated paper cartridge. With a condemnation limit of 10 psi, cartridge "A" indicates on the chart above a life cycle of 50 hours versus 66 hours for the new WIX development. Note that, throughout its longer service life, the WIX cartridge never exceeds trace amounts as opposed to the performance of cartridge "A" as shown on chart below.



Shown at the left—WIXITE Primary Fuel Filter Cartridge. At the right—the New WIX P-1 Second Stage Fuel Filter Cartridge whose outstanding performance is pictured above.



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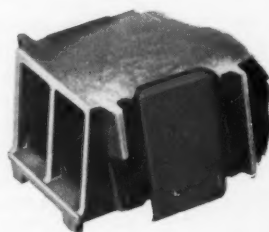
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C-1 TRUCK



***because it was properly
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*International Division
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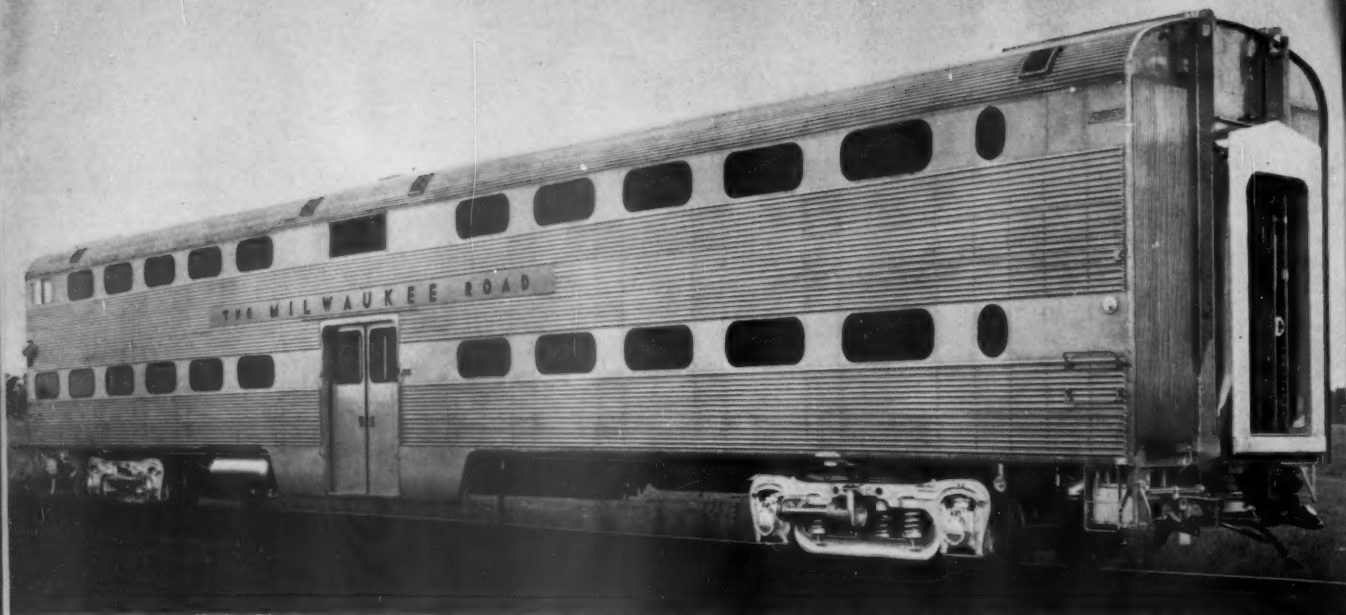
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BEARING ADAPTERS • NATIONAL SPEEDLOADER CONTAINER HANDLING SYSTEM**



High-capacity, lightweight coaches which Budd is currently delivering are all to be in service by mid-September. Milwaukee Road has become fourth U.S. line to adopt the gallery-type car for commuter service and the second to acquire cab-control cars for bi-directional operation.

Milwaukee Puts Stainless-Steel Cars in

The first stainless-steel gallery-type, push-pull cars have just been put in service by the Milwaukee on its Chicago area suburban lines. Budd is currently delivering eight cab cars and 32 trailers. The Milwaukee is to power its new trains with six 2,400-hp E9, four 1,750-hp F9, and three 1,500-hp FP7 locomotives.

All power requirements of the cars—air conditioning, heating, lighting, door controls and battery charging—are supplied directly from the locomotive through a 480-volt, three-phase, 60-cycle distribution system which is trainlined through all the cars. Each of the locomotives to be used in the bi-directional service has been equipped with an alternator powered by a 600-hp Cummins diesel.

Bi-directional operation gives to locomotive-powered trains the flexibility and high availability which is a characteristic of electric multiple-unit train operations. Either arrangement makes possible rapid turn-around.

Each cab car is equipped with a locomotive-style cab and standard locomotive control station at one end of the gallery, or upper, level. All cab and trailer cars are equipped with complete electric train lines of the same type used through multiple-unit diesel locomotives. This makes it possi-

ble to transmit necessary control signals from a cab-car cab at one end of a train through the train to the diesel locomotive at the other end. Standard Milwaukee operation, like that of the Chicago & North Western which originated the push-pull concept in the U.S., will be to have a cab car on the Chicago, or inbound, end of each of its push-pull trains and a locomotive on the opposite, or outbound, end. Trains may also have intermediate cab cars within their consists. Shorter trains may then be operated in non-peak hours simply by splitting one of the longer rush-hour trains at an intermediate cab unit and leaving unneeded cars in the station.

Diesel-traction equipment on the eight cab cars includes a standard GM locomotive controller, standard 26-C cab air-brake equipment, and controls for air horn, bell, windshield wiper, headlights, sanders, and similar equipment. The cab end of each of these cars is fitted with headlight; oscillating type, red rear warning light; body-mounted pilot; two-chime horn; bell, sanders and electrically heated windshields.

The gallery-type commuter-car design originated with Budd which built 30 of these coaches for the Burlington in 1950. In 1959, the C&NW

ordered the first push-pull bi-level cars and has since embarked on a program which is now completely replacing all conventional commuter cars with 200 bi-level, high-capacity cars.

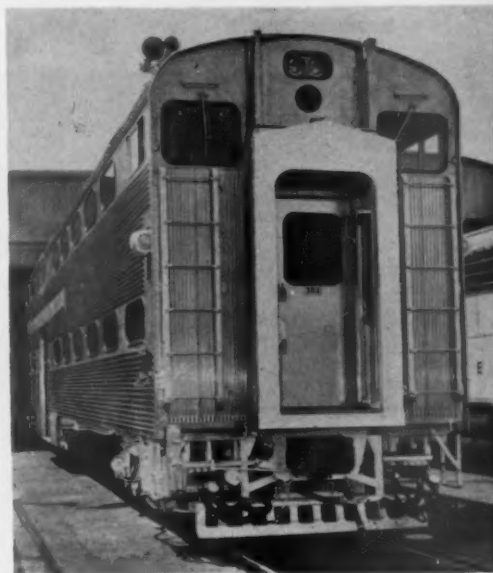
Ready-to-run weight of the new 156-passenger Milwaukee cab car is 106,680 lb, and weight of the 162-passenger trailer is 100,740 lb.

Both types of cars have a standard Budd stainless-steel center sill extending between bolsters and terminating at each end in an arc-welded, low-alloy carbon-steel end underframe unit. Outer ends of each end underframe unit are welded to the car's end framing, while the ends of its integral body bolster are welded to the side sills. In addition to the bolster, there are four stainless-steel cross-bearers which are also welded to the channel-shaped side sills.

Topping the stainless-steel sub-floor in the passenger compartments are ½-in. plywood panels which are covered with Terraflex vinyl asbestos tile flooring. The sub-floor is insulated with a 3-in. thickness of fiber glass. The tile-covered gallery, or upper level, floors are 1-in. metal-faced plywood supported at the walls by continuous brackets attached to the side posts and at the aisles by longitudinal members extending from the stair wells to the

Partial List of Suppliers

Trucks	LFM Mfg.	Seat covering	United States Rubber
Truck springs	Crucible Steel Co. of America	Doors and interior panels	United States Plywood
Air brakes	Westinghouse Air Brake	Lavatories	Crane
Wheel and axle assembly	Standard Steel Works	Light fixtures	Trans-Lite
Hand brake	Ellcon-National	Door operators	National Pneumatic
Brake shoes	Railroad Friction Products	Glass	Libbey-Owens-Ford
Journal bearings	Timken Roller Bearing		Pittsburgh Plate Glass
Draft gear	Waugh Equipment	Water cooler	Ajax-Consolidated
Couplers and yokes	National Steel Castings	Air-conditioning equipment	Trane
Equalizers	Canton Drop Forging & Mfg.	Heating equipment	Vapor Heating
Shock absorbers	Monroe Auto Equipment	Filters	Farr
Locomotive controls	General Motors	Jumpers and receptacles	Albert & J. M. Anderson
Insulation	Johns-Manville		Joy Manufacturing
	Owens-Corning Fiberglas	Wire and cable	Anaconda Wire & Cable
Windows; dia-phragms; lug-gage racks	Adams & Westlake	Batteries	Electric Storage Battery
Coach seats	Heywood-Wakefield	Lettering and numbering	Minnesota Mining & Mfg.
Cab seats	Coach & Car Equipment	Warning lights	Mars Signal Light
Vinyl-coated steel	United States Steel	Speed indicators	Barco Manufacturing
		Sanding controls; bell ringers	Prime Manufacturing
		Warning horns	Leslie



Cab car has pilot, headlight, and standard horn and bell. All cars have electrical jumpers.

Commuter Service

car ends. These longitudinal members also form the passenger railings. The center-car vestibule floors and steps are formed of diamond-pattern stainless plates. Walls and ceiling of this area are also stainless steel.

The car's structure is designed as a modified plate girder, using the sides as shear carrying members connecting the roof to the floor and serving as the chord members.

Roofs, sides, and ends are insulated with 3-in. thickness of fiber glass, $\frac{3}{4}$ lb per cu ft density. Interiors of the passenger compartments are lined with textured-vinyl-covered galvanized carbon steel. End walls of the passenger compartments and the wainscoting, or side walls below the windows, on both levels have an Alberta green vinyl finish. The pier panels between windows and the walls above are beige vinyl.

Windows are set in tan-colored molded plastic frames mounted in the car structure. Windows are double-glazed units with graduated tinted glass, eliminating need for shades.

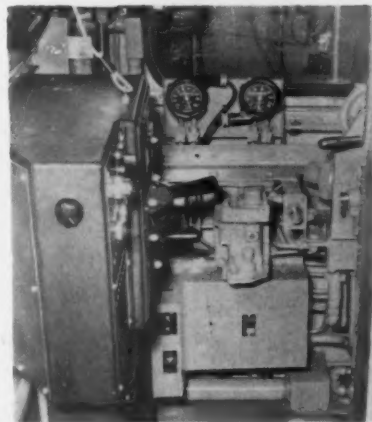
On the lower level, passenger seats are of the double throwover type, with vinyl-plastic-covered, foam-rubber cushions mounted in chromeplated tubing frames. Each of the four upper level galleries has a combination

of one-passenger flip-over seats adjacent to center stairway and longitudinally mounted theater-type seats.

Air conditioning consists of a pair of self-contained, electro-mechanical units mounted over the center vestibule. Each of the passenger compartments is cooled by one of these 8-ton, 2,400-cfm units. Air ducts for the lower level are formed by the raised platforms on which the upper level seats are mounted. Air is delivered to the upper level by a ceiling center duct running from the center vestibule to the end of the car, with branch ducts supplying the lower level.

In addition to the complete air conditioning, there is a Moduletric electric heating system which assures winter comfort. Each of the separate heating systems—one for each end of the car—consists of controls, a 12-kw overhead electric heater adjacent to the evaporator coil in the air-conditioning unit for heating the circulated air, and floor heat elements totaling 12 kw which provide radiant and convective heat at floor level along the outer sides of the car.

In each section of the car are a set of three thermostats and a temperature control panel. One thermostat controls the heating; one controls the



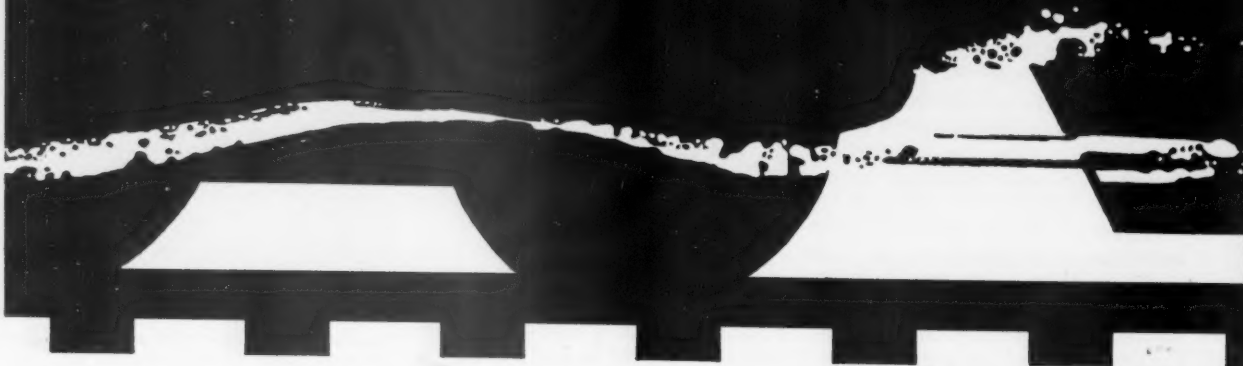
Cab-car equipment includes standard GM locomotive controller and 26-L brake valve.



Bright and well lighted interiors of new cars are proving popular with commuters.



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Differential thermal expansion which produced cracks in this insulation is typical of problems which must be solved during the design process.

Developing Traction-Motor Insulation

Locomotive development has been accompanied by a constant demand for more power. Horsepower per traction motor has steadily increased, although physical size and basic design have not changed. Higher outputs have been attained principally by going to higher locomotive speeds while retaining substantially the same torque values. This generally means much more severe mechanical shocks and vibration, but no great difference in maximum motor temperatures.

Railroads have shown growing concern about maintenance costs—a multi-million-dollar item. This has led to demands for a “million-mile motor.” Quality of new motors is not the only concern. Railroads are also anxious to upgrade their old motors:

- To increase motor life on present applications;
- To fit motors for higher horsepower on upgraded locomotives.

A careful analysis of the fundamentals of insulation system design is needed to evaluate both new designs and insulation practices for maintenance of existing traction equipment. The “million-mile motor” concept implies no basic overhaul during that length of service and practically no premature failures. In designing for this goal, first cost and maintenance cost must be balanced so that the total

is a minimum. The interrelation of electrical and mechanical requirements and the influence of maintenance practices are both important.

Progress in traction-motor insulation systems does not come easily. Different insulation systems must be analyzed, considering both insulation and conductors. Further evaluation should involve laboratory tests and, then, engineering tests on completed machines. Field tests should then be used for final evaluation. Field tests require close cooperation between the manufacturer and the railroad. Tests must be carefully designed to produce true comparisons. They must be closely followed even though this is difficult, because the locomotives operate over many miles of line. In spite of these obstacles, careful field tests are essential to the progress of any insulation development program.

Electrical requirements for traction equipment are modest (about 25 volts per mil). Normal insulation resistance must be high enough to prevent ground relay operation. A small leakage current is to be expected, even on a new, clean, dry motor. This will increase in service as creepage surfaces become contaminated.

The more exposed insulations in and around the commutator chamber should be arc resistant. For example, cotton is better than glass for string bands, because glass becomes conducting at low red heat, tending to prolong the flashover arc. Teflon is superior to porcelain, mycalex glass, or

plastic for brushholder insulators.

In most applications traction apparatus is subject to rapid load changes and may operate considerably above the continuous rating for several hours. Design must be based on long service life, rather than AIEE classifications. Two motors designed for the same application may be equally satisfactory, although not identical in material and construction.

The rather modest electrical requirements must be met under conditions of very severe mechanical and thermal abuse. Resistance to thermal degradation, the most obvious requirement, is recognized by AIEE standards. In this respect, glass is preferable to paper and silicone varnish to alkyds or epoxies. The design is balanced by allowing greater temperature rise on fields to offset the more severe mechanical stresses experienced by armatures. Insulation deteriorates at a rate which increases exponentially with temperature.

In addition to thermal degradation, insulation is subjected to mechanical stresses, such as flexing caused by shaft bending and core deflections, vibration generated by faulty gearing, torsionals caused by the motor bouncing on its nose support, and expansion caused by temperature increases.

Maintenance practices also affect insulation life. Motors and generators may be cleaned in place to increase insulation resistance. This can do more harm than good. Dirt may be washed into inaccessible cracks and corners

First of two installments based on a paper presented before an AIEE Land Transportation Committee meeting by J. K. Wentz and R. M. Lukes of the Locomotive and Car Equipment Dept., General Electric Co.

where it cannot be removed and may cause solid grounds. Wiping dirt off the string band and brush holders will usually raise the insulation resistance of the machine appreciably without depositing dirt in cracks and without contaminating the commutator and brushes. Cleaning equipment after removal from the locomotive is best done in a degreaser. Here, the quantities of solvent which condense on the surface are so great that the dirt is flushed away instead of being deposited in inaccessible spots, or without causing deterioration of the insulation.

Various Insulations

Recognition of the continuing increase in the severity of the requirements for traction-motor insulation has led to the formulation of a specification for the insulation of the future. Many polymeric materials have been studied in the continuing search for new insulating materials.

Alkyd resins (Glyptal) have been used with mica, glass, varnished cambric, and other materials. In general, the alkyds are being replaced with materials which have greater thermal stability. Polyesters have found considerable success in making an improved insulation system, because of their thermal stability, moisture-proofness and hydrolytic stability.

When first developed, silicones seemed destined to replace polyesters and alkyd resins with a truly high-temperature stable resin having excellent electrical properties. Attempts to completely insulate traction machines with silicones have shown good thermal conductivity, but also limitations such as low cut-through strength and reversion.

Teflon appeared promising because of high thermal stability, chemical inertness, and low surface energy. A

traction motor insulated with Teflon in 1950 failed after only a few days in test. Poor cut-through strength of the Teflon tape caused failure between coils. Considerable laboratory work was done in an effort to develop a process for applying Teflon directly to copper conductors. Two armatures wound with Teflon insulated coils failed because the material was unable to withstand high mechanical pressure at operating temperatures.

Glass has the advantages of mechanical strength, reproducible quality of product, high thermal endurance, high moisture resistance, good oil, acid and solvent resistance, and good electrical properties. It has been evaluated for insulation use as flake-glass paper, glass beads and glass fabric. Beads having high electrical quality can be used as spacers in coils. Glass reinforced plastics are increasingly used in slot wedges, armature bands, and laminated structures. Considerable study has been made on glass finishes to obtain better adhesion of the resin.

While freshly formed samples of the urethanes have good moisture resistance, rapid deterioration occurs at temperatures experienced in traction motors. Melamine resins have some advantages for use in slot wedges; but difficulty of machining offsets them. Epoxy resins have excellent electrical properties, moisture resistance and thermal stability, and readily compound or mix with other types of materials. Pure epoxy resins are generally hard and brittle. Considerable work has been done to make them more flexible, but certain properties are sacrificed in the process. Epoxy resins can be "flexibilized" to the point where they become soft and cheesy, or they can be flexibilized to a lesser degree so that they still retain reasonable mechanical strength.

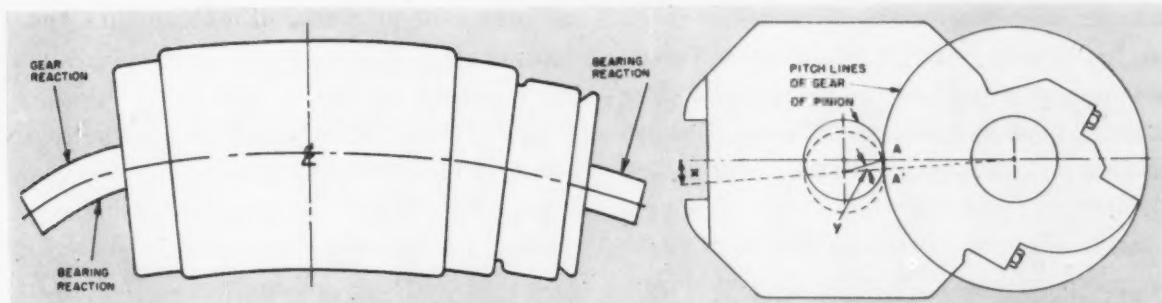
Traction service subjects insulating

materials and systems to many different stresses. In seeking to use insulation most advantageously and provide for its best maintenance, a detailed examination of these stresses and their effects is in order. These can be classified generally as heat, moisture, chemical, and mechanical stresses.

Continued cure. The cure of an insulating varnish or resin involves a process of polymerization or gelation in which the relatively small molecules of the uncured material join together to form a large interconnected network that is essentially one large molecule. The degree of interconnection is a measure of the cure. The precise nature of the varnish or resin determines whether or not there are by-products during curing. In most materials, as for example alkyd resins and phenolics, the extent (tightness) of cure advances with time. This advance, accelerated by heat, eventually results in brittleness. As a general rule, polyesters cured by peroxide catalysts are not as sensitive to this process. Epoxy resins lie somewhere between silicones and polyesters, which are most resistant, and phenolics and alkyds.

Oxidation. Practically all traction insulation operates in contact with air. The rate of reaction with oxygen and the effect of this reaction are important. Generally, the result of oxidation is brittleness and eventual disintegration. The most oxidation-resistant materials seem to be the silicones and some of the phenolics and polyesters. Epoxy resins vary quite widely in sensitivity to oxidation. In traction equipment, the hottest parts are "buried" the deepest and have minimum contact with air. The hottest materials do not necessarily suffer most from oxidation.

Thermal degradation. In insulating
(Continued on page 48)



Mechanical stress, such as the flexing caused by the bending of the shaft during operation, can damage insulation (left). Torsional stresses can be generated when motor bounces on its nose support. The frame swings through angle X and the armature jerks through angle Y. These forces must be considered along with the electrical and thermal stresses to which the insulation is subjected.



Two sides of

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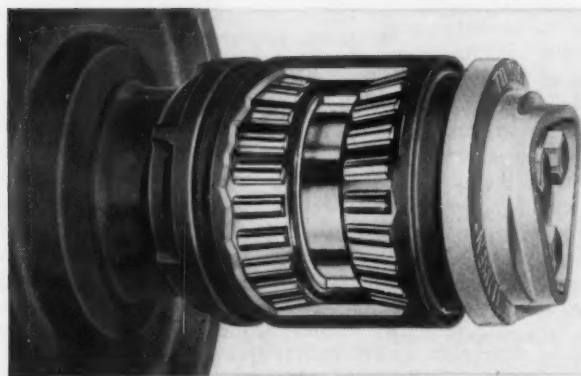
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(Continued from page 45)

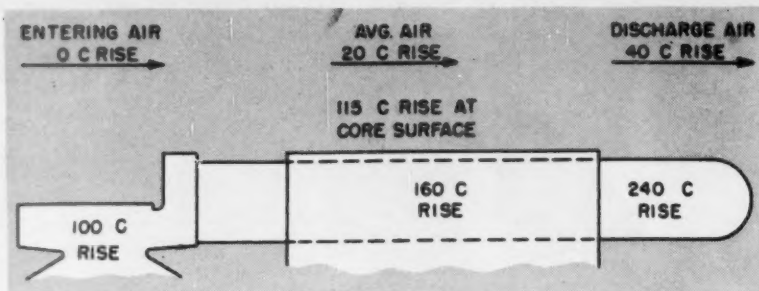
materials, the rupture of carbon-oxygen bonds and carbon-carbon bonds by heat is particularly serious when dealing with materials, such as cellulose, containing the hydroxyl group. Silicones are highly resistant to thermal degradation and, to a lesser extent, so are polyesters and alkyds in the absence of air. Epoxy resins vary quite widely. Some epoxies, when cured, have a large number of hydroxyl groups in the structure and tend to dehydrate at elevated temperatures.

Thermal softening. All varnishes and resins soften with increasing temperature. A measure of this is the heat distortion point, called more formally the flexural deformation temperature (FDT). Its value is the temperature at which a standard bar of the material in question, when heated at a standard rate, takes a standard deformation when loaded with a standard weight. Unfortunately, FDT gives no information whatsoever about the strength at higher temperatures. Actual measurements have demonstrated that two different materials having the same FDT can have widely different strengths at somewhat higher temperatures. It is important, therefore, not to judge a material by FDT alone, but also by the extent to which it maintains its strength above these temperatures. It has been demonstrated that the tighter the cure of a resin, the higher the FDT is likely to be, but it must be borne in mind that brittleness also increases.

Volatile by-products. Potential sources of trouble are gasses given off by some materials when heated. Silicones, under certain circumstances, give off volatiles that cause increased brush wear.

Electrical conductivity. Some insulating materials develop greatly increased conductivity at high temperatures. Glass, a highly ionized material, becomes quite conductive as it becomes more fluid. Care should be employed in using glass cloth or glass tape where arcing can cause a relatively short path to ground through the glass.

Hydrolysis. Rupture of chemical bonds by water is called hydrolysis. Most susceptible in insulations are the esters, which include polyesters, alkyds, and silicones. Epoxies cured with acid anhydrides are, in reality, polyesters and are subject to hydrolysis as are alkyds and conventional polyesters. Rupture of chemical bonds



Air removes practically all heat from motors. Insulation must be designed for good transfer.

within the resin structure eventually leads to mechanical or electrical failure.

Swelling and softening. Mica, either as large splittings or as mica paper, delaminates under high humidity. In a system which depends for its integrity upon mica-resin bonds, high humidity can lead to cohesive failure of the mica and failure of the bond. Paper is very hydrophilic and, once having absorbed moisture, is very difficult to dry. A silicone coating may give excellent protection against liquid water, but very poor against water vapor. Even though epoxy resins are wet readily by water, they give protection against penetration both by liquid water and water vapor. This protection can disappear when, and if, the epoxy resin cracks.

Tracking. The formation of permanent conducting paths in plastic materials by the action of temporary conducting paths formed on the surface is known as tracking. Arc resistance differs from track resistance; tracking is caused by low-current discharges of relatively high potentials. Teflon is a good arc-resistant material, mainly because the surface decomposes and vaporizes under the heat of the arc and blows off the conducting contaminants and decomposition products.

Contamination and electrolytes. Repeated wetting and drying of insulation can lead to contamination by soluble electrolytes in the water, producing permanently low insulation resistance. The use of alkaline detergent cleaning solutions, a common maintenance practice, can cause permanently low insulation resistance. If these cleaners are used, the minimum amount should be employed and rinsing should be thorough.

Catalytic decomposition. Resins used in insulation systems may decompose in the presence of certain metals. There is a strong reaction between copper and the peroxide catalyst in un-

cured polyester resins. The bond strength between resins and copper deteriorates at 180°C and above in the presence of air.

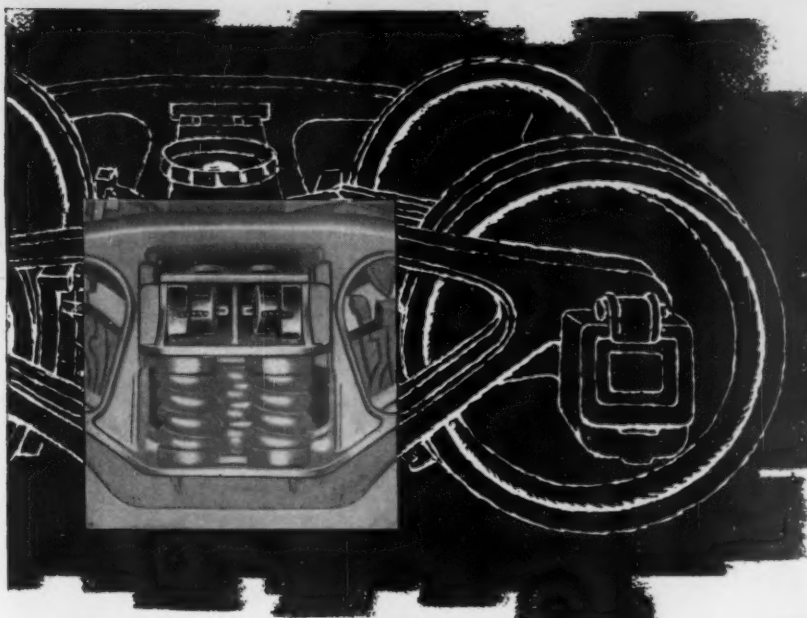
Organic solvents. Swelling and crumbling of resins and plastic materials can be caused by chlorinated solvents, such as trichlorethylene and perchlorethylene. Aromatic solvents, such as methyl ethyl ketone, acetone, toluene, xylene and benzene are quite injurious. Solvents, such as naphtha, kerosene, and gasoline, are rather harmless except towards rubber, polyethylene or similar materials. If a solvent must be used for cleaning, the minimum amount should be applied for the minimum length of time. A vapor degreaser is one of the best ways for cleaning in solvents.

Toughness. The property of requiring the maximum input of work to cause rupture (toughness) requires a balance of tensile strength, elasticity and resiliency.

Creep. A non-reversible deformation of a plastic material when subjected to a steady stress—creep, occurs to some extent with virtually every resin or plastic. The endurance limit of a material is the ultimate permissible stress that can be placed upon it for long-term loading. All resins are subject to creep, but it is most pronounced with materials with minimum cure and crosslinking. Highly cured, tightly crosslinked materials show much less creep than do the more elastic, rubbery ones.

Fatigue. Decrease in ultimate rupture stress caused by intermittent loading, or fatigue, depends upon the amplitude and frequency of strain. Glass-binding bands, very widely used on traction armatures, are susceptible to fatigue if improperly designed and applied. The resin, the glass, the method of application and the amount of build up are all of great importance.

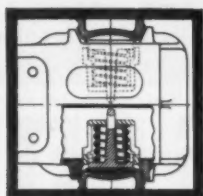
(To Be Continued)



convert old freight
car trucks to high
speed service this
money-saving,
cost-cutting way!

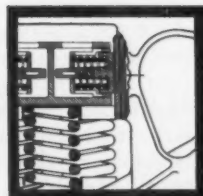
Save 80% over the cost of new Freight Car Trucks

NEW



New Large control spring for
full face pressure, longer life.

NEW



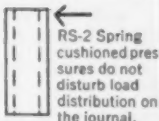
New Center Retention Means
for simplified assembling and
dismantling.

with the NEW HOLLAND RIDE STABILIZER RS-2

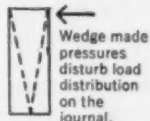
There's no need to let those serviceable old Freight Car Trucks be limited to slow speed service when you can convert them to profitable operation at a fraction of the cost of new trucks... The Holland Ride Stabilizer RS-2 has proven to give the same high-speed, lading-protecting, easy-riding characteristics you get in new, costly freight trucks.

You can convert any bolster of A. A. R. approved design and stabilize the ride laterally, vertically and longitudinally... The direct spring loaded control system of the Holland RS-2 **does not** cause uneven wear of the Journal Bearing when abnormal forces are exerted. Wedge made pressures just **do not** occur. Installation of the RS-2 components is unusually simple... And Holland Engineers will give you on-the-job assistance.

Write or call for the new Tell-All
Bulletin RS-2.



RS-2 Spring
cushioned pres-
sures do not
disturb load
distribution on
the journal.



Wedge made
pressures
disturb load
distribution
on the
journal.

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Spring Travel.



STYLE E-2 Volute Snubber
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Upgrades ride by introducing an unusually smooth snubbing action with an exceptionally high load carrying capacity. Holland's principle of utilizing the sliding action of telescoping radially compressed coils with ample friction area eliminates the "bombarding" problem.

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Collinwood Diesel Terminal.

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Cleans Diesel Filters, Screens and Other Parts *Automatically*

A diesel locomotive pulls up to a platform of New York Central's Collinwood Diesel Terminal . . . and all filters, screens and other small but essential parts are inspected, cleaned and replaced where necessary *within 45 minutes!*

The secret? A bank of 5 low-cost Magnus Miji Lif mechanically-agitated cleaning machines, each charged with a different Magnus cleaning solution, solvent or oil. As inspection reveals a part that needs cleaning, the mechanic simply loads it into the machines with the correct solution and flips switches. The Miji Lif's do the rest — servicing 30 diesels in just 24 hours!

FOR EXAMPLE:

CUNO FILTERS
Cleaned in #3 Miji Lif;
rinsed in #2 Miji Lif.

**AIR COMPRESSOR
INTAKE FILTERS**
Cleaned in #4 Miji Lif,
then oil-dipped in #5
Miji Lif.

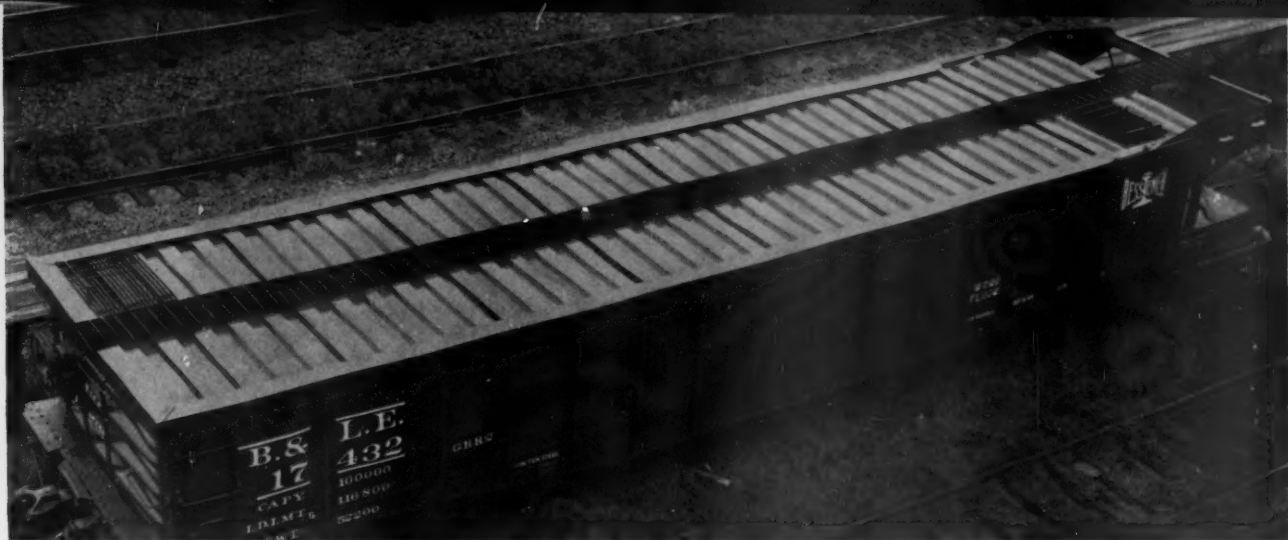
**SINTERED BRONZE
FUEL OIL FILTERS**
They're cleaned in #1
Miji Lif, rinsed in #2 Miji
Lif, then blown with steam.

**LUBE OIL
SUCTION STRAINERS**
Cleaned in #3 Miji Lif;
rinsed in #2 Miji Lif.

*Like to know how
you can profit from this
labor, time, material and
cost-cutting Magnus Method?
Then ask your Magnus Man,
or write directly to:*



A WORLD-WIDE ORGANIZATION SPECIALIZING IN THE CLEANING AND PROTECTION OF ALL SURFACES.



Watertight MacGregor roof can be readily cranked open or closed by one man. Storing rack shortens length of carbody.

Covered Gondola Has Integral Roof

A covered gondola with an integral roof has just been completed by Railroad Supply & Equipment, Inc., U.S. licensee of the International MacGregor Organization which originally developed the arrangement for ship hatch covers. A Bessemer & Lake Erie 46-ft gondola was made available for the first U.S. installation of the MacGregor opening and self-storing roof. This car is equipped with eight of the chain-operated roof panels patterned after smaller roofs already in service on over 2,000 European cars.

The MacGregor roof, regardless of size, consists of a series of interlocking ribbed panels which are supported by rollers and moved by a precision-built endless-chain system operated by a hand crank at one end of the car. Each section rests on a pair of flanged rollers which run on tracks mounted atop the car's top side angles. Tracks, rollers, and the edges of the panels, along with the endless chains which are attached to each side of the panel most distant from the driving crank, are housed in a box-shape structure formed by a pair of angles bolted to each of the car's top side angles. This arrangement forms a waterproof enclosure for the sides of the panels when the roof is closed. Ends of the panels lap over each other so that these transverse joints are also waterproof.

To open the roof of the car, a lock adjacent to the hand crank is released. When the crank is turned, the chains extending down both sides of the car are moved so that the leading roof sec-

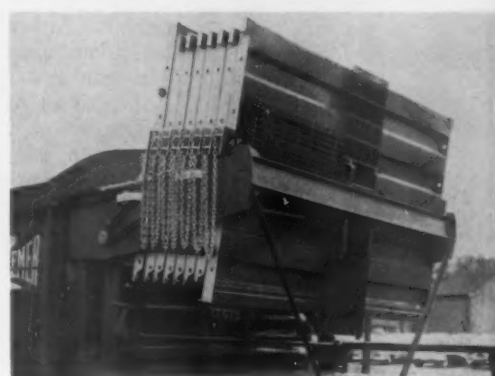
tion at the far end of the car is pulled toward the operating crank. This leading panel pushes each of the intermediate sections toward, and into, the storage ramp as it is pulled down the length of the car. The chain and drive are manufactured to close tolerances so that they form a positive drive without slippage, producing completely smooth operation. All rollers have Oilite bearings. The crank is operated by one man. Cranking pressure is about 10 lb and, at a normal cranking rate, the roof can be closed or opened in less than 2 min.

In addition to its main rollers, each roof section has a set of guiding rollers that serve to tip the panel into its vertical storage position at storing ramp.

During closing, the guiding rollers on each roof panel act to return it to the horizontal position. The endless chain again moves the leading section. This section is linked by a pair of short chains to the panel immediately behind it, and each succeeding panel is likewise connected to the one behind. As the leading panel is moved down the car, its pull first lowers each panel so it interlocks with one ahead, and rolls it to its final, fully closed position.

Because roof panels are joined with each other only by the short chains, it is possible to replace any damaged panel simply by lifting it from the storing ramp and substituting a good section in its place.

While the overlapping of the panels and the gutters which form the chain runway keeps rain from entering, there



Storing rack holds panels when roof is open.

is some ventilation through overlaps.

Storage of the roof panels does require sacrifice of some cubical space. The 46-ft B&LE gondola was cut back 46 in. to install the storing ramp. According to engineers, the production model for a 46-ft gondola will provide an inside body length of 42 ft 4 in. It could be 43 ft 5 in. if running boards were ever eliminated.

Railroad Supply & Equipment will soon be producing a self-contained unit ready to be set on the car. The B&LE gondola which has been equipped with the MacGregor roof was built 21 years ago and, although there was considerable body distortion, the roof was installed without complication and can be closed and opened as readily as it could on a new car.

RS&E has also completed a MacGregor roof installation on a highway trailer and designed one for box cars.

Doc Lands His Answer

By Gordon Taylor



Doc Watts, the electrical foreman, had just entered the meeting room of the local diesel club when Pat Parker, a foreman at the Gulf Route, spied him. "You're just the man that I wanted so see," Pat shouted as he dashed over. "You gave me such good information on worn traction gears (RL&C, May 1961, p. 29) that I'd like to get your ideas on some other troubles we are having. I'm wondering if you could stop at our shop some day. We could talk over my troubles and, afterward, I'd take you to my favorite fishing spot where I can guarantee that you'll quickly catch your limit."

"Well," said Doc, "my weakness is fishing and I'm just sucker enough to fall for that bait. I'll be over to see you Saturday morning. Set up that fishing trip for Saturday afternoon."

On Saturday when, Doc got to the Gulf Route shop he found Pat correcting some trouble caused on a locomotive by grounded control circuits. The control relay had been shunted out by a chafed connection on a water-soaked wire leading to positive battery and by a chafed B12 wire grounded where it emerged from a conduit. With Doc's suggestions this trouble was soon cleared up.

"Thanks," said Pat; "this isn't the thing I really wanted to discuss. I'm ashamed that you found us with trouble that should never happen if we carefully checked control wiring and corrected weak insulation values when they are found."

This series of articles is based on actual experiences of men who operate and maintain diesel-electric locomotives.

"What I wanted to talk about is our traction motor commutators. Some of them are losing their smooth burnished surfaces. Most of them still have that dark oxide film which makes such a perfect surface for brush contact; but we do have others that don't look at all good. Frequently we have to rework them."

"Well," said Doc, "let's look over some of your motors and see if we can get any clues about your trouble."

They started down through the shop. After looking over all the motors on three units, and finding nothing wrong, Doc asked, "How much trouble do you have? There certainly doesn't seem to be anything wrong with these commutators."

"Actually this trouble isn't too common," answered Pat. "Every so often we find a unit with commutators which have lost the oxide film and in its place have the raw copper appearance which we know to be a surface over which the brushes do not move smoothly."

"Let's keep looking," suggested Doc. "I still want to go fishing."

The first motor on the next unit to which Pat and Doc then turned their attention proved to have a commutator with the raw copper appearance. "Let's check the other motors on this unit," said Doc. Their inspection showed the other three motors were in the same condition.

"It's odd," said Doc, "that we'd find all the motors on this unit in the same shape. This unit must have been assigned to some particularly heavy service. Are these the same grade of

brushes used on the other traction motors?"

"Sure are," answered Pat. "After a lot of testing, we settled on a standard brand and grade of brush which has been satisfactory, except for the occasional unit which shows up with commutators looking like this. The brushes will also be wearing faster than usual."

"To what types of service has this unit been assigned?" asked Doc. "Are there other units around that have been working with it?"

"On its most recent trip it was by itself and not doing any work!" said Pat. "You see, it was towed in dead about 600 miles from the west end of the line. When we have heavy freights going west, we frequently multiple five units to get the trains over the heavy grades west of here. Along with giving us plenty of power for the westbound trip, this arrangement makes it possible to send units out west for local or freight or yard service. When one of these units is again due for its regular inspection, such a unit will frequently be deadheaded back into this shop in a train. That shouldn't be too hard on commutators, should it?"

"Well, you have given us something to think about," Doc replied. "The fact that all four motors are in the same condition indicates that we are not dealing with individual motor troubles. Some operating condition is apparently affecting all motors on this unit in the same way."

"First, let's consider what causes a motor commutator to develop the
(Continued on page 59)



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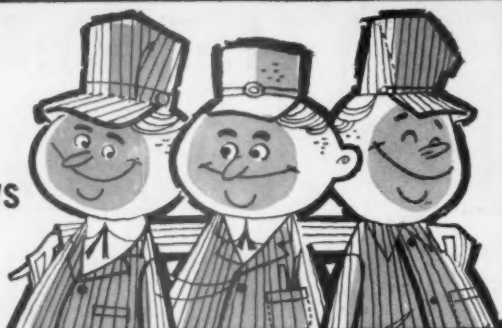
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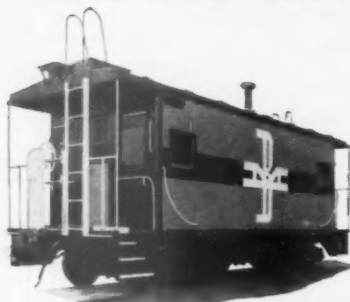
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INTERNATIONAL CAR DIVISION



A Subsidiary of Ryder System, Inc.

Personal Mention

(Continued from page 10)

Grand Trunk Western.—Battle Creek, Mich.: H. W. ASKEW appointed general superintendent equipment.

Gulf, Mobile & Ohio.—Mobile, Ala.: C. W. ESCH appointed chief mechanical officer, succeeding C. M. HOUSE retired.

Mr. Esch began with the GM&O as chief draftsman in 1926 and has served, successively, as mechanical engineer, master mechanic, superintendent of motive power and car equipment, and assistant general superintendent of motive power and car equipment.

Maine Central.—Portland, Me.: WILLIAM E. MALOY appointed mechanical instructor—train rules examiner. MELVIN L. CHARITY, appointed road foreman of engines.

Milwaukee. — Chicago: C. A. BORGH appointed district general car foreman, with supervision over all passenger and freight-car operations at Division street and Western Avenue. J. D. O'NEILL appointed general car foreman, Western Avenue coach yard, succeeding Mr. Borgh. **Tacoma, Wash.:** J. V. SANDS appointed district general car foreman, succeeding Mr. O'Neill. **Bensenville, Ill.:** L. P. BARRY appointed general car foreman, succeeding Mr. Sands. **Minneapolis, Minn.:** L. A. LINDEMER, car foreman, appointed assistant district general car foreman, Milwaukee Terminals, Davies Yard, succeeding Mr. Barry.

Missouri Pacific.—St. Louis, Mo.: LAWRENCE R. CHRISTY, chief mechanical officer, retired. **DeQuincy, La.:** R. E. HAUSSNER appointed assistant master mechanic, DeQuincy division.

Monon.—Lafayette, Ind.: E. E. KAUFFMAN appointed superintendent motive power and equipment, succeeding V. C. GOLDEN, now general manager, (RL&C, June, p 46).

Pennsylvania.—Chicago: A. R. MARSH appointed superintendent—equipment. Formerly assistant manager heavy repair shops at Altoona, Pa.

Seaboard.—Jacksonville, Fla.: L. B. ALEXANDER appointed master mechanic, North and South Florida divisions. **Savannah, Ga.:** J. G. CARLTON appointed master mechanic, Carolina division, succeeding Mr. Alexander. Mr. Carlton formerly master mechanic at Atlanta, Ga. **Tampa, Fla.:** F. B. CLARK, master mechanic, retired.

Southern Pacific. — San Francisco, Calif.: J. W. McLAUGHLIN appointed general master car repairer, succeeding WILLIAM B. MEDILL, retired. **Los Angeles, Calif.:** F. KIMBALL appointed district master car repairer, succeeding Mr. McLaughlin. O. E. DENMAN appointed general foreman, car department, succeeding Mr. Kimball. Mr. Denman formerly general foreman, car department, at El Paso, Tex.

OBITUARY

Karl F. Nystrom, 79, retired chief mechanical officer, Milwaukee, died June 5 in Evanston Hospital, Evanston, Ill.

Supply Trade Notes



Fred W. Genger
National Castings



P. O. Willaman
WAB



L. S. Williams
WAB

NATIONAL CASTINGS CO.—Fred W. Genger appointed sales manager, New York office, Transportation Products Div. Mr. Genger formerly in headquarters sales offices in Cleveland.

■
RAILROAD FRICTION PRODUCTS CORP.; COBRA FRICTION PRODUCTS LIMITED.—S. L. Williams elected president and general manager of Railroad Friction and Cobra Friction, both of which companies are jointly owned by Westinghouse Air Brake Co. and Johns-Manville Corp. Mr. Williams also assistant to the general manager of the Air Brake Div., WAB.

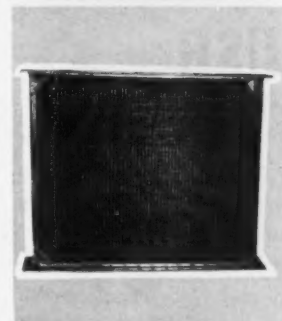
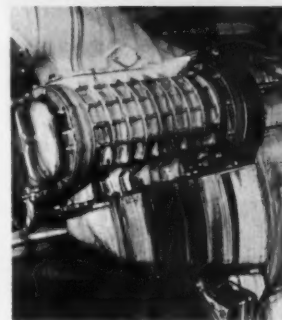
■
WESTINGHOUSE AIR BRAKE CO., AIR BRAKE DIV.—P. O. Willaman appointed manager, Cobra brake shoe sales, with headquarters in division's New York office—Empire State Building, 350 Fifth avenue.

■
LEWIS BOLT & NUT CO.—Frank W. Hughes, Suburban Station Building, Philadelphia 3, Pa., appointed central east coast representative for Sealrite bolt and Locktite nut division.

■
VELLUMOID CO.—Bruce R. Williams has joined Vellumoid Co. of Worcester, Mass., a subsidiary of W. R. Grace & Co., as assistant sales manager.

■
ALCO PRODUCTS, INC.—James L. Layton, transportation products sales representative, appointed regional sales manager.

■
AIR REDUCTION-SPEER CARBON CO.—Agreement has been reached for the acquisition by Air Reduction of the assets



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can clean dirty
engine parts
faster and better
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LIX cleans everything! . . . fuel injectors, pistons, engines, lube oil coolers, exterior surfaces. LIX is specially formulated to meet your specific railroad cleaning needs . . . and to do it fast, efficiently and economically.

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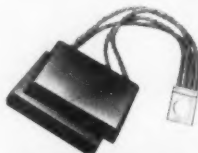


DEAD OR ALIVE

Bar BURNING BRUSH

wanted for assault on commutators. Highly dangerous, with pyromaniac tendencies. Known to haunt diesel-electric locomotives in an effort to make contact with potential victims. *Beware!* Suspect is emotionally unstable and armed with substance that pits and burns coppers.

When captured, suspect should be remanded to custody of Stackpole Carbon Company, St. Marys, Pa. If proved guilty, Stackpole brush specialists will make prompt recommendations for adopting well-bred brushes that give longest life consistent with burn-free commutation.



STACKPOLE *diesel-electric* BRUSHES

keep diesels rolling p-r-o-f-i-t-a-b-l-y

electrical contacts • seal rings • welding & brazing tips • graphite bearings
electrochemical anodes • voltage regulator discs • electrical & electronic components
rocket nozzles

and business of Speer Carbon which will continue to operate under present management from headquarters at St. Marys, Pa.

AMERICAN BRAKE SHOE CO.—Cast-iron freight-car wheel plant at St. Louis, Mo., being converted to the manufacture of "Southern" cast-steel wheels at a cost of \$2,000,000. Cast-steel wheel plant at Calera, Ala., also being expanded at a cost of \$1,000,000.

WINE RAILWAY APPLIANCE DIV., UNITCAST CORP.—Modern Supply Co., Robert E. Mann, and Earle A. Mann appointed agents.

PULLMAN-STANDARD. — George L. Green, sales vice-president, elected vice-president in charge of marketing, succeeding T. P. Gorter, who continues as a vice-president, sales.

MOBILE OIL CO.—Charles F. Garney appointed manager of railroad sales, national accounts department. Mr. Garney's name and title appear incorrectly under General Electric Co. in the May issue.

GENERAL ELECTRIC CO.—GE announces two new universal type diesel-electric locomotives—the U8B and the USB rated at 900 and 600 hp, respectively.

ELECTRO-MOTIVE DIV., GENERAL MOTORS.—Floyd E. vonOhlen appointed western special representative at San Francisco, Calif., succeeding Corliss A. Bercaw, retired.

OBITUARY

JAMES W. CROSSETT, 52, district manager, railway publications, Simmons-Boardman Publishing Corp., Chicago, died May 26 at Hinsdale Sanitarium and Hospital, Hinsdale, Ill.

Trade Publications

FASTENERS. Gripco lock nuts, clinch nuts, weld nuts, special nuts, and smifinished nuts listed in 20-page Catalog 161. (Write: Grip Nut Co., subsidiary of Heli-Coil Corp., Dept. RLC, South Whitley, Ind.)

CEMENTED CARBIDE PRODUCTS. Catalog 61 covers Kendex tools, Kendex K-bars, standard blanks, brazed tools, clamped inserts, and Kendex milling cutters. (Write: Kennametal Inc., Dept. RLC, Latrobe, Pa.)

TRANSPORTATION MAINTENANCE CLEANING. 6-page folder gives detailed information on Wyandotte products for vehicle washing, steam cleaning, paint removal, radiator cleaning, and engine cleaning. (Write: Wyandotte Chemicals Corp., J. B. Ford Div., Dept. RLC, Wyandotte, Mich.)

SAFETY POSITIONER. Bulletin AD-108 describes advantages of Saf-T-Bloc for snubbing of power presses during die servicing and maintenance operations. (Write: Duff-Norton Co., Dept. RLC, 4 Gateway Center, Pittsburgh 22, Pa.)

What's New

(Continued from page 12)



Airless Spray Equipment

Eleven models, portable and stationary, are included in the Hydra-Spray line of airless spray equipment. The 5-gal Monark Hydra-Spray is designed for direct spray from original 1- to 5-gal containers. The 10-gal President models are available with or without elevator, three-wheel truck, surge tank, or filter. All work from the original 1- to 10-gal containers and handle one- or two-gun operations. Stationary 55-gal models utilize President or Bulldog pumps and are designed for multiple-gun, high-speed application of material. Either Monark or President pumps may be used with the Hydra-Stand units, in which material is kept circulating and drawn into the stand only as it is used. *Gray Co., Dept. RLC, 1062 Sibley st. N.E., Minneapolis 13, Minn.*

Portable Cleaner

The portable Buck Cyclone cleaner, an adaptation of the stationary model, is specially designed for cleaning cars and locomotives. It replaces hand dusting and sweeping methods with papers, dirt, and dust, being loosened by an air hose and the debris drawn out of the cars by the cleaner. Car-cleaning time, it is said, is cut by more than half and substantial savings in labor realized. *Ross & White Co., Dept. RLC, 400 W. Madison st., Chicago 6.*

Rust Preventives

Magnafilm 230 is a water-compatible, non-flammable rust preventive that can be applied directly to dry surfaces, or to surfaces wet with water or with soluble cutting oil emulsions. It conforms to Military Specification MIL-C-40084 (ORD) covering "Corrosion Preventive Compound, Water-Emulsifiable, Oil Type." Magnafilm 120 is composed of film-forming materials and rust inhibitors dissolved in safety solvent with water-displacing and fingerprint neutralizing compounds. *Magnus Chemical Co., Dept. M-124-4, Garwood, N. J.*

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Townsend lockbolts are easy to install with a 2 or 3 man crew. Ordinary type fasteners require larger, more costly, highly specialized crews. Increased driving speed and the elimination of fitting-up operations step-up production. Worker fatigue is minimized.

A demonstration—in your office or on the production line—can be easily arranged. Our field engineer will demonstrate the practical and long lasting benefits of Townsend lockbolts. Write Townsend Company, Engineered Fasteners Division, P. O. Box 71-RR, Ellwood City, Pennsylvania.

*Licensed under Huck patents RE 22,792; 2,114,493; 2,527,307; 2,531,048; 2,531,049; and 2,754,703.

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Milwaukee Bi-level Cars

(Continued from page 41)

cooling, and the third positions an air-inlet damper. This damper conserves electric power by restricting entry of outside air during cold weather. When the temperature in the car is above 65 deg F, the damper is open and 12 kw are made available to the overhead heater and 4 kw to the floor heat. If the temperature of the car is below 65 deg F, the damper is closed and the 4 kw is switched to the overhead duct and 12 kw to the floor heat.

There is a 50-deg exterior thermostat for anti-freeze protection. The outside thermostat automatically controls the anti-freeze equipment in the toilets and the door-track heaters. These strip heaters in the foot of the door jamb provide smooth operation of the doors in even the coldest weather and eliminate snow or ice before it can interfere with door operation.

Upper and lower levels are illuminated by continuous fluorescent fixtures on the sides of the ceilings. Incandescent fixtures light vestibules, toilets, and cabs. All main lighting

operates on 120-volt a-c; there are battery powered 32-volt, d-c emergency lights in some fixtures.

A transformer supplies the 120-volt a-c for lighting and door controls. Mounted under one of the gallery stairways in each car is a 93 amp-hr, 32-volt, lead acid battery, charged through a rectifier. The 64-volt, d-c locomotive controls are powered through the 27-conductor traction control train line.

All vestibule side doors can be pneumatically operated from any vestibule control station on the train.

The four-wheel trucks are of the single-equalizer, inside swing-hanger type, with coil springs throughout. Each truck has longitudinal bolster anchor rods and a pair of hydraulic shock absorbers which damp vertical bolster motion. Trucks have 6- x 11-in. roller bearings and 33-in. multiple-wear wrought-steel wheels. There is an individual tread-brake unit with composition shoe on each wheel.

Coupled length of each car is 85 ft. Height of the carbody above the rail is 15 ft 9 1/2 in.; height from rail to vestibule step, 1 ft 6 3/8 in.; height to main floor, 3 ft 8 13/16 in., and to gallery floor, 9 ft 1 1/16 in.

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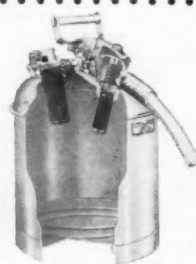
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Doc Lands His Answer

(Continued from page 52)

oxide film that gives brushes the desirable burnished contact path. Commutators don't have this highly polished oxide film when motors are received new from a builder. The film is formed when the proper grade of brushes, properly fitted to a perfectly round commutator running true in its bearings, are feeding current to the commutator. The flow of electric current has an important role in the formation of that oxide film.

"Without current flow," continued Doc, "you do not develop the film that all maintenance men like to see on a commutator. Many people do not realize what is taking place in a traction motor when a diesel is moving at 50 to 80 mph. Let's do a bit of figuring on your blackboard."

At the board Doc continued: "The average traction motor has a commutator diameter of 15.5 in., a circumference of slightly more than 4 ft. A freight unit with 40-in. driving wheels and 62-15 gearing has a gear ratio of 4.13. When operating at 50 mph, the motor armature is turning 1,720 rpm. The commutator surface speed under the brushes is 1,720 times 4 ft, or 6,880 ft per min.—that is 114 ft per sec. This means that the commutator speed is about 78 mph beneath the brushes. On a passenger unit, the commutator will slide beneath the brush at speeds up to 100 mph or more.

"It is now easy to see that a freight unit hauled dead in a train at speeds up to 50 or 60 mph for 600 miles could give its traction motor commutators a good dry shampoo that should develop lots of friction and do much to rub off the oxide film formed in regular service.

"Brush manufacturers who have

made extensive tests will tell you that low average current density through brushes will result in the loss of the oxide surface film on commutators. If low current density will cause a loss of oxide film, think what happens when there is no current flowing at all.

"Another thing to consider is that, while the diesel unit was traveling 600 miles, the commutator surface traveled beneath the brushes a distance of 936 miles at speeds ranging up to 80 mph. Maybe it is no wonder that these commutators developed such a raw copper appearance.

"When we first placed our diesels in service a number of years ago," continued Doc, "they were shipped to us without traction motor brushes and we applied brushes before the units went into service. In fact, I recall that in the days when we operated gas-electric cars, those cars were always hauled to distant terminals without brushes. Then brushes were installed before the 'doodlebugs' went back on their regular runs.

"There are a number of factors that can affect commutator surfaces. When there is streaking or a raw copper surface, the source of trouble may be faulty commutation resulting from use of the wrong grade of brush, from low humidity of air surrounding the commutator, from excessive commutator temperature, from low average current density, or from excessive brush pressure.

"When a commutator surface becomes raw or streaked, the brush friction increases. This may cause chattering which can result in sparking. That starts a cycle of cleaning the commutator, and checking brushes so that a new oxide film will be formed to provide a path of minimum friction for the brushes. Certainly it is true that the less you have to sandpaper or stone a commutator, the more you prolong its service life.

"I think," said Doc, "that the cause of your trouble is your practice of moving diesel units dead in trains for long distances. Whether it's serious enough to require that units be worked to new assignments, instead of being deadheaded, is something you and your management will have to determine.

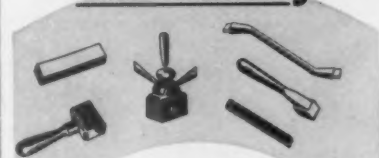
"I pointed out the probable cause of your trouble; now it is your turn to point out the spot where I can catch my limit of fish. I'm ready to start, so let's go."

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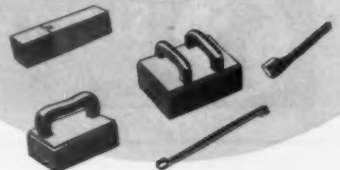
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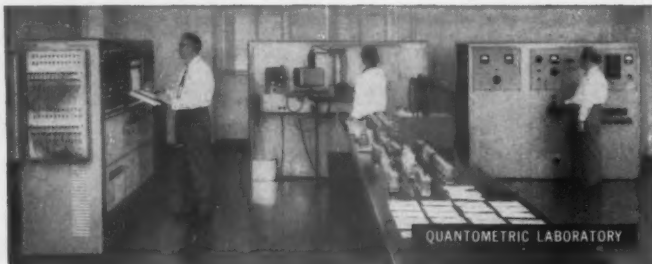
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Full-scale railroad diesel engine tests lubricants in Shell's Martinez laboratory. Talona RS Oil 40 passed rugged 1000-hour test in this engine, was then released by Shell Research for intensive field trials.

BULLETIN:

Railroads report that diesel locomotives using Shell's Talona RS Oil 40 can run for more than 250,000 miles without an oil change

Diesel locomotives used to require an oil drain every 30,000 to 50,000 miles. Now, even locomotives in heavy-duty freight service are rolling 250,000 miles—and more—without an oil change. The reason: Shell's Talona® RS Oil 40. Read how this new lubricating oil can trim operating costs for you.

UNDER normal railway operating conditions, Shell's new Talona RS Oil 40 can be used from overhaul to overhaul without draining.

And with Talona RS Oil 40, railroads are finding that they can extend intervals between engine overhauls. Often, by substantial margins.

Five key reasons

Here are some of the key reasons for the outstanding performance records that this new diesel lubricant is making:

1. Talona RS Oil 40 contains special

additives to resist oil oxidation. This allows the oil to lubricate effectively, without excessive thickening, even in prolonged heavy-duty freight service.

2. Talona RS Oil 40 has good detergent-dispersant qualities. It helps keep engines exceptionally clean.

3. Talona RS Oil 40 contains alkaline additives to help neutralize damaging acids—a major cause of engine wear in diesel locomotives.

4. Talona RS Oil 40 provides outstanding protection for silver bearing surfaces.

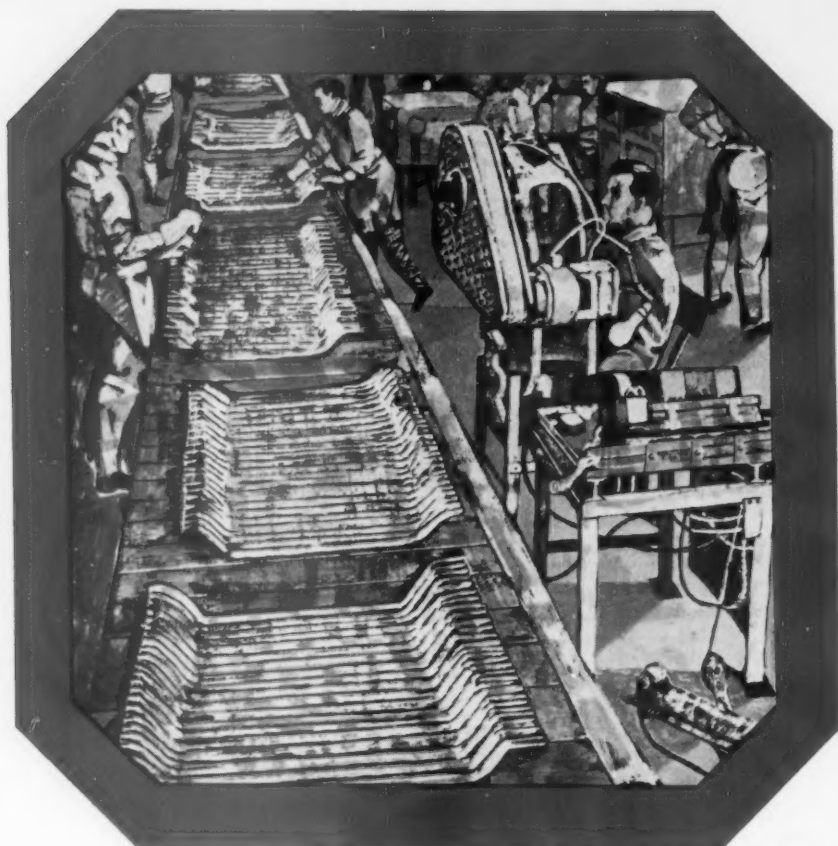
5. Talona RS Oil 40 has excellent filterability—a must for locomotive diesel oils.

NOTE: All U. S. railroad diesel engine manufacturers have endorsed Shell Talona RS Oil 40 for use in their equipment.

Your Shell Railroad Service Engineer will give you the details. Or, write: Shell Oil Company, 50 West 50th Street, New York 20, New York.



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